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Interactive Expertise and Dyadic Common Ground

in Younger and Older Couples

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TABLE OF CONTENTS

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ABSTRACT

Individually available cognitive-mechanic competencies decrease across adulthood. One possible strategy to compensate for these developmental losses in cognitive skills is to collaborate with others (e.g., Bäckman & Dixon, 1992). However, interacting with others is resource-intensive in itself (e.g., Pickering & Garrod, 2004). This constraint to collaborative cognition can limit its usefulness, especially in late adulthood. In this dissertation, I therefore asked how collaborative cognition may be facilitated in old age. Focusing on communication as an important collaborative everyday-life task, I investigated two possible facilitating factors. First, *interactive expertise* among familiar partners can facilitate collaboration because it is informed by past experiences with the partner (Dixon, 1999). Second, familiar partners can use a special form of interactive expertise by using their shared knowledge (*dyadic common ground)* to save resources (Clark & Marshall, 1981). Both facilitating factors may be especially beneficial for older adults, but empirical evidence on this suggestion is scarce and diverse. I developed a dyadic communication paradigm based on the game Taboo$^{©}$ to investigate these propositions. The task was to explain a target word to an interaction partner, using as few cue words as possible. 76 younger adults (20–33 years) and 80 older adults (63–79 years) carried out the task (a) with their spouses and (b) with an unfamiliar cross-sex partner of the same age group. The number of cue words needed until the partner guessed the target was determined by independent, trained coders and served as collaborative performance outcome. Each cue was also coded regarding the use of dyadic common ground. Multilevel modeling analyses revealed that spouses outperformed unfamiliar partners. This effect was comparable for both age groups. Follow-up analyses provided indirect evidence for age-differential benefits from interactive expertise: The effect of partners' familiarity on performance was larger in persons with lower cognitive-mechanic skills. Follow-up analyses also showed that the familiarity effect was moderated by variables reflecting the amount of spouses' interactive practice. Cueing the spouse with dyadic common ground was associated with better performance only in older, but not in younger couples. Follow-up analyses indicated that using dyadic common ground also improved younger adults' performance when they explained more difficult targets. In sum, this dissertation provides evidence that both interactive expertise and dyadic common ground (a) can enhance collaborative cognition in younger and older adults and (b) may imply particular benefits to older adults. These results support the idea that using interactive expertise with a familiar partner can help to positively shift the cost–benefit ratio of collaborative cognition – especially in old age.

INTRODUCTION

"And you know what I got? Swine fever!"

When I recently entered the Berlin subway, this remark stemming from the conversation between two young men caught my attention. The boys sounded excited, and they were potentially contagious: I backed up a little but could not help keeping track of their conversation. As it turned out, the two of them were not carriers of a serious infection, but rather studied veterinary medicine and had just passed an oral exam – in which one of them was asked about swine fever. This example illustrates that communicating with another person is a surprisingly complex task: Even a simple statement may be misinterpreted if the listener makes wrong assumptions about the speaker's intentions and background knowledge on a communication subject. In the overheard subway conversation, the message was tailored for a *specific* recipient who was familiar with the speaker and shared contextual information with him. In contrast, an unfamiliar person like me failed to grasp the intended meaning of the message.

Conversation is an important means for *collaborating* with others. For example, people might ask others to help them find their mislaid glasses, or talk to each other to decide jointly on important life issues. The psychological literature suggests that collaborating may become more important in late life because individual cognitive-mechanic resources (i.e., basic information-processing capacities that can be invested into a task; Kahneman, 1973) decrease throughout adulthood (e.g., Lindenberger, 2000; Park, 2000). Collaborating with another person may help to compensate for these individual losses (e.g., Dixon, 1999; Martin & Wight, 2008).

However, interacting with another person can be complex and resource-demanding in itself (e.g., Levine, Resnick, & Higgins, 1993; Pickering & Garrod, 2004). This may pose a special challenge to older adults with fewer cognitive-mechanic resources at their disposal than younger adults. In the present work, I will therefore investigate how interactions may be facilitated to support older adults' collaboration. I will address two potential factors in this regard: Partners' familiarity in general, and the use of shared knowledge among familiar partners in particular.

In the first research question of the dissertation, I will focus on the potential benefit of *partners' familiarity* for their collaborative performance. Experience-based knowledge about previous interactions with a familiar partner can facilitate an interaction because assumptions about a familiar partner can be made with higher accuracy and lower resource demands (Dixon,

1999). I will refer to this acquired competence as *interpersonal expertise* (Dixon, 1999). Reducing the cognitive demands of a collaboration may be more beneficial for older than for younger adults' collaborative performance. Therefore, it has been repeatedly proposed in the literature that older adults may profit more from collaborating with a familiar partner than younger adults do (cf. Dixon, 2000).

Empirical evidence on this suggested age-differential benefit from partners' familiarity is rare and divergent. I will investigate this question by comparing younger and older adults' collaborative performance in a newly developed dyadic-communication task, which participants carried out (a) with their spouse, and (b) with an unfamiliar partner. The task was to explain target words to the partner, who then had to guess the target. The explaining person was instructed to use as few cue words as possible. The number of words required by the explaining partner to elicit the correct response from the partner served as a measure of collaborative performance. This novel paradigm offered multiple advantages for the present investigation: It modeled a collaborative everyday-life situation in which one person wishes to communicate a piece of information to another person. Moreover, the interaction partners' familiarity was experimentally varied, which allowed for a within-person comparison of younger and older adults' collaborative performance.

In the second research question, I will address a particular characteristic associated with partners' familiarity, namely the partners' ability to refer to shared knowledge, which I refer to as *dyadic common ground* (cf. Clark & Marshall, 1981). With this emphasis, I will go beyond observing performance differences between familiar and unfamiliar partners and highlight a potential facet that may contribute to these differences. From the lifespan perspective taken in the present work, I will ask whether using shared knowledge enhances older couples' collaborative performance to a greater degree than in younger couples. Talking about a topic may be facilitated if the partners refer to the memory of a related shared experience. Furthermore, adult-age differences in memory functioning suggest that dyadic common-ground cues might be more supportive for older adults' memory performance, as compared to younger adults (cf. Craik, 1986), but empirical evidence on this suggestion is not available to date. To test this prediction, each cue used among spouses was externally coded with regard to the dyadic common ground it implied, allowing me to analyze the association of this special cueing strategy with participants' collaborative performance. Using multilevel modeling in all analyses, I will be able to consider participants' performance on the level of individual trials (i.e., target words), while accounting for multiple interdependencies in the data structure.

The dissertation is organized as follows. First, I will describe the theoretical background of the present investigation. Here, I will propose a developmental view on collaborative cognition and describe key concepts of lifespan theory (e.g., P. B. Baltes, Lindenberger, & Staudinger, 2006). From this developmental perspective, I will then provide an overview of the research on possible benefits and boundaries of collaborative cognition. I will then outline the research questions and hypotheses of the present investigation. Subsequently, I will describe the sample, research design, and the newly developed experimental paradigm. After elaborating on the statistical analyses, I will report on the results of the present study. Finally, I will discuss the findings in the context of previous work and suggest directions for future research.

1. THEORETICAL BACKGROUND

The dissertation investigated adult-age differences in collaborative cognition. In the following, I will provide an overview of the theoretical and empirical literature that informed the present study. In section 1.1, I will define the concept of collaborative cognition and outline the developmental relevance of this phenomenon. In sections 1.2 and 1.3, I will describe central propositions of lifespan developmental theory and introduce the theory of Selective Optimization with Compensation (SOC Theory, P. B. Baltes & Baltes, 1990; cf. Riediger, Li, & Lindenberger, 2006) as a meta-theoretical framework for developmental regulation. Building on this, I will elaborate on how these general developmental propositions can help to understand aging trajectories regarding the benefits and boundaries of collaborative cognition (sections 1.4 and 1.5) and derive the general research question of the present dissertation (section 1.6). Subsequently, I will introduce two factors that may alter collaboration outcomes in younger and older adults. Those factors are the interaction partner's familiarity (section 1.7), and familiar partners' ability to use shared knowledge in their interactions (section 1.8). From the review of the literature, I will then derive the research questions and hypotheses for the empirical part of the present work (section 1.9). I will conclude part 1 by explaining the necessary demands to the research design for the present investigation (section 1.10), introducing the chosen paradigm and design (section 1.11), and describing the specific predictions for the observed performance in this task (section 1.12).

1.1 A Developmental Perspective on Collaborative Cognition

Many cognitive tasks in everyday life are performed in the presence of, or in collaboration with, other persons, such as the planning of an outing, deciding on a job offer, or making a list of errands. This is not always a result of an active choice of the involved individuals, but simply a function of the social surroundings in people's everyday lives (Levine et al., 1993).

Dixon (1999) suggested that the term *collaborative cognition* should be applied to any cognitive activity that occurs while (a) two or more persons are present in a situation or are engaged in a cognitive activity, and (b) the involved individuals share a representation of a common goal that the activity is directed at (for similar definitions, see M. M. Baltes & Carstensen, 1999; Clark, 1985; Tomasello, Carpenter, Call, Behne, & Moll, 2005; Wegner, 1986).

Dixon (1999) pointed out that this concept of collaborative cognition does not necessarily imply that a given activity is effective per se, or even cooperative. Although dyad or group members might try to work towards a common goal collaboratively, the interactive process may be ineffective, uncoordinated, or even uncooperative. Therefore, this definition of collaborative expertise does not imply the quality or the outcome of collaborative cognition. When the term of collaborative cognition will be used in this dissertation, it will refer to Dixon's (1999) definition as outlined above.

Research on collaborative cognition has covered a broad variety of collaborative phenomena. As suggested by Dixon's (1999) definition, the mere presence of other persons can influence the way an individual performs on a cognitive task (for reviews, see Jonas & Tanner, 2006; Karau & Williams, 1993; Levine et al., 1993). A person's cognitive reaction to a stimulus can also be altered by the directed influence of others (for reviews, see Crano & Seyranian, 2007; Galam & Moscovici, 1991; Wood, Lundgren, Ouellette, Busceme, & Blackstone, 1994). Finally, research has been carried out across various cognitive tasks to find out how the combined achievements of dyads or groups differ from the cognitive performance of individuals who work solitarily, and which factors influence the outcomes of collaborative performance (e.g., P. B. Baltes & Staudinger, 1996; Cheng & Strough, 2004; Galeger, Kraut, & Egido, 1990; LePine, Piccolo, Jackson, Mathieu, & Saul, 2008; Levine et al., 1993).

Developmental work on collaborative phenomena has addressed adult-age trajectories of collaborative performance (e.g., P. B. Baltes & Staudinger, 1996; Blanchard-Fields, Hohorta, & Mienaltowski, 2008; Martin & Wright, 2008; Strough & Margrett, 2002). This research interest stems from two considerations. It has been suggested that collaboration may be potentially beneficial in old age in that it helps to compensate for individual age-related losses (e.g., Martin & Wight, 2008). However, interacting with others is a complex task and can therefore be rather demanding for older adults, which may set boundaries to the usefulness of collaboration in old age (cf. Gould, 2004). Therefore, one may gain a better understanding of adult-age trajectories of everyday functioning by (a) investigating factors that generally contribute to successful collaboration (independently of the collaborators' age), and (b) identifying factors that differentially influence collaborative performance as a function of the involved persons' age.

The conceptual framework of the present dissertation can be described by three emphases: First, I took an *adult-age developmental perspective* on the phenomenon of collaborative cognition. Second, I was interested in the characteristics of the *social constellation* in which collaborative cognition is carried out, and in a possible age-differential effect of such factors on collaborative performance. More precisely, I compared younger and older adults' collaborative

performance when they worked with their spouse, and when they worked with an unfamiliar partner. Third, the present work went beyond observing performance differences associated with different interaction partners in younger and older adults by addressing a *specific characteristic* of familiar interaction partners' collaboration, namely familiar partners' ability to make use of the knowledge they share with each other. Here, I was interested in the effect of using shared knowledge on familiar partners' collaborative performance, and possible age differences therein. From the developmental perspective of the present work, the aspects of partners' familiarity, and the shared knowledge among them, were considered meaningful conditional aspects of collaboration: Based on previous work, I will propose that the demands of collaboration, which may be higher for older, than for younger adults, may be *altered* in an age-differential way by the interaction partners' familiarity in general, and by familiar partners' use of shared knowledge in particular.

To prepare the ground for these assumptions, I would first like to outline the lifespan-psychological background of the present work.

1.2   Lifespan Propositions on Cognitive Development in Adulthood

The framework of this dissertation is embedded in propositions of lifespan developmental theory (e.g., P. B. Baltes, 1987, 1990; P. B. Baltes et al., 2006). Within this conceptualization, human development is perceived as a *lifelong process* that encompasses both stability and change in competencies and behavior throughout all phases of life (P. B. Baltes, 1987) and that unfolds within biological and socio-cultural contexts (P. B. Baltes & Reese, 1984; Dixon & Lerner, 1983). Moreover, the human lifespan is proposed to be characterized by *multidirectionality*, meaning that both gains and losses within and across domains can occur in any phase of life (P. B. Baltes, 1987, 1990).

A central proposition of lifespan theory is that development is *multidimensional*, which implies that trajectories of growth and decline in a given domain (e.g., sensorimotor functioning, cognition, and self and personality) are influenced by several subcomponents. For the cognitive domain, a conceptual distinction has been made by suggesting two components of intellectual functioning: *cognitive mechanics* and *cognitive pragmatics* (e.g., P. B. Baltes, 1987, 1997; P. B. Baltes, Staudinger, & Lindenberger, 1999; Lindenberger, 2000). This distinction was informed by the distinction of *fluid* and *crystallized* components of intellectual functioning in earlier work by Cattell (1971) and Horn (1982). Cognitive mechanics pertain to the speed and accuracy of basic information processing, which is largely influenced by biological aging. This component subsumes working-memory capacity, processing speed, reasoning, cognitive control, and abilities

needed to inhibit task-irrelevant information or reactions. In contrast to this, cognitive pragmatics refer to acquired, knowledge-based skills (e.g., procedural and declarative cultural knowledge, domain-specific or professional expertise, and wisdom; P. B. Baltes, 1987, P. B. Baltes et al., 1999).

The two theoretically distinct dimensions of mechanic and pragmatic cognitive abilities are assumed to jointly influence cognitive performance (P. B. Baltes, 1987; P. B. Baltes et al., 1999). Accordingly, empirical approaches that address their distinction do not claim to assess the two components in perfect isolation. To nevertheless measure these components separately, the respective studies use tasks that are assumed to primarily challenge one of the two components. For example, cognitive mechanics are measured by participants' perceptual and motor speed on relatively context-independent tasks. In contrast, pragmatic skills are assessed by measuring a person's acquired knowledge (e.g., lexical knowledge or vocabulary), with a lesser focus on how fast this knowledge can be produced in a given situation. Evidence from these approaches support a theoretical distinction of the two components: Divergent developmental trajectories have been observed for cognitive mechanics and cognitive pragmatics (see Fig. 1.1).
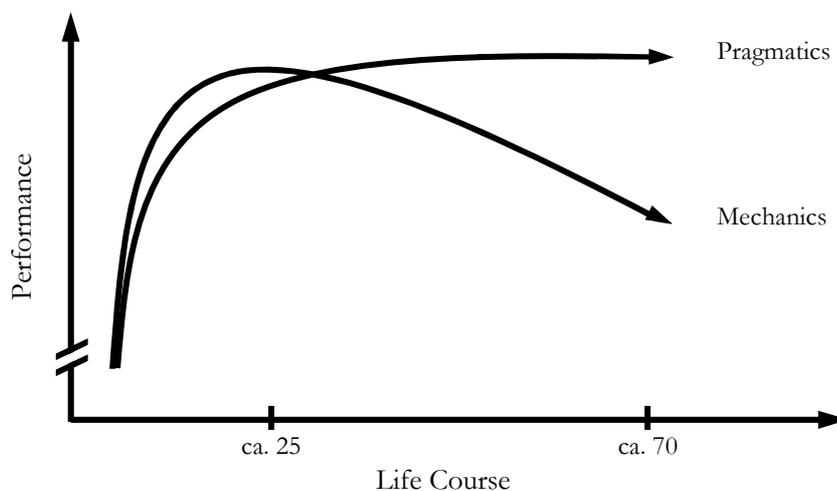
Figure 1.1. Schematic trajectories of cognitive mechanics and pragmatics across the lifespan (adapted from P. B. Baltes et al., 2006; after P. B. Baltes & Graf, 1996).

Cognitive mechanics show an inverse U-shaped function across the lifespan, with an increase in mechanic competencies across infancy, childhood, and adolescence, and a peak in young adulthood. After this, developmental trajectories of mechanic skills follow an approximately linear decline across adulthood, and feature an even steeper decline in very old age

(Case, 1985; Kail & Salthouse, 1994; Lindenberger & Reischies, 1999; Schaie, 1994, 1996; Singer, Verhaeghen, Ghisletta, & Lindenberger, 2003). Similar to cognitive mechanics, the pragmatics of cognition have been shown to grow rapidly until young adulthood. However, these skills have been shown to remain relatively stable or even increase across the adult lifespan, being preserved well into old age. Only in very advanced adult age, pragmatic skills become less available and effective. This decline, however, is not as pronounced as that observed for cognitive mechanics (P. B. Baltes, Staudinger, Maercker, & Smith, 1995; Bosman & Charness, 1996; Charness & Krampe, 2008; Clayton & Birren, 1980; Salthouse, 2000).

1.3   The Theory of Selective Optimization With Compensation (SOC)

Along with the propositions that human development encompasses multidirectional trajectories, (i.e., both gains and losses; P. B. Baltes, 1987, 1990) in any phase of life, successful development has been characterized by a maximization of developmental gains and a minimization of losses (Brandtstädter, 1986; Brandtstädter & Wentura, 1995). The SOC meta-model (P. B. Baltes & Baltes, 1990; cf. Riediger et al., 2006) suggests that development in any given domain and in any phase of life is characterized by three general developmental mechanisms that regulate this gain–loss dynamic: selection, optimization, and compensation. Selection pertains to the *directional aspect* of development. It addresses the necessity to focus on selected developmental options. For any developmental option taken, the processes of optimization and compensation regulate the *level* of functioning in a given domain. Optimization describes an expansive process that encompasses the acquisition and refinement of competencies. The process of compensation is directed at maintaining or regaining a previously achieved level of functioning in the face of losses in a given domain. With advancing adult age, resources become scarce in many domains (for an overview, see Freund & Riediger, 2003). According to Alexandra Freund & Paul Baltes (2000), resources are multiple factors that help individuals to interact with their environment, such as cognitive or physical abilities, professional expertise, social support, or material belongings. Although maintenance and even gains of resources are still possible in many domains in old age, the ratio of gains to losses becomes less favorable across adulthood (P. B. Baltes, 1987). Besides aging-related losses in cognitive-mechanic skills, resource losses encompass physical and health-related losses (Aiken, 1989; Whitbourne, 1985, 2001; Medina, 1996), sensual impairments (e.g., P. B. Baltes & Lindenberger, 1997; Lindenberger & P. B. Baltes, 1994; Tesch-Römer & Wahl, 1996), loss of social partners due to death, and increasing constraints on the life time that remains for future planning (Carstensen, Isaacowitz, & Charles, 1999; Lang & Carstensen, 2002). This constitutes a developmental

situation in which SOC processes may become particularly important for the regulation of successful development. In the face of multiple aging-related losses, it is particularly important to select developmental options and opt out of others, and to promote successful development in a chosen domain by the regulatory processes of optimization and compensation. The particular need to compensate for aging-related losses implies an increased need for culture in late adulthood, encompassing psychological, material, technological, and symbolic (i.e., knowledge-based) resources (P. B. Baltes, 1997; P. B. Baltes et al., 2006). The SOC meta-model describes *universal* mechanisms of human development. It covers both general and specific dynamics, active and passive processes, as well as conscious and subconscious actions and reactions of the organism. As a meta-model of human development, the theory may be specified for different domains of functioning and various levels of analyses.

The present work focuses on the domain of cognitive functioning. It has been suggested that aging-related declines in cognitive mechanics may be compensated by pragmatic cognitive skills, for example, by relying more on one's acquired knowledge, and using mnemonic strategies, external devices, or collaborating with another person (e.g., P. B. Baltes, 1987; Bäckman & Dixon, 1992; Dixon, Rust, Feltmate, & See, 2007; Marsiske, Lang, Baltes, & Baltes, 1995). This dissertation investigates older adults' collaboration with close social partners as an example of a compensatory resource in old age. In the next section, I will outline why collaborative cognition offers itself as a compensatory means across adulthood, and describe the research that has been conducted on the benefits people have from collaboration in cognitive tasks.

1.4   Collaborative Cognition as a Compensatory Means

According to the SOC theory outlined above, people can compensate for developmental losses by using various means. In the domain of cognitive functioning, compensation may, for example, involve external memory aids such as calendars, diaries or shopping lists (Lindenberger, 2005; Lindenberger & Lövdén, 2006; Lindenberger, Lövdén, Schellenbach, Li, & Krüger, 2008). It may also involve investing more time or effort to accomplish a cognitive task (Bäckman & Dixon, 1992; M. M. Baltes, Maas, Wilms, Borchelt, & Little, 1999; Dixon & Bäckman, 1995). This dissertation focuses on a particular means that may be used to compensate for individual cognitive resource losses, namely, collaborating with other persons (Dixon, 1999; Johansson et al., 2005; Martin & Wight, 2008; Strough & Margrett, 2002). Individuals remain socially active far into old age, suggesting that collaboration remains potentially available across the lifespan (Carstensen et al., 1999; Freund & Riediger, 2003). Moreover, engaging in interactions with others is a well-practiced competence and may be easier to accomplish than using alternative

compensatory means, such as novel technical devices (Ross, Spencer, Blatz, & Restorik, 2008). Collaboration may, for example, be realized via communication with another person, a competence that is well preserved far into late adulthood (Ryan, Giles, Bartolucci, & Henford, 1986).

The potential of collaborative cognition has been investigated across numerous cognitive tasks, such as collective induction (e.g., Laughlin, 1996, 1999; Laughlin & Hollingshead, 1995), collaborative decision making (for an overview, see Kerr & Tindale, 2004), collaborative everyday-problem solving (e.g., Blanchard-Fields, Chen, & Norris, 1997; Cheng & Strough, 2004; Meegan & Berg, 2002), collaborative wisdom-related performance (e.g., Staudinger & Baltes, 1996), and collaborative performance in brainstorming tasks (e.g, Nijstad & Stroebe, 2006; Mullen, Johnson, & Salas, 1991; Taylor, Berry, & Block, 1958). Across various cognitive tasks, these strands of research have provided evidence that collaborating individuals' performance is superior to that of a solitary individual (Gould, 2004; Martin & Wight, 2008; Stephenson, Kniveton, & Wagner, 1991). Collaborating with others may therefore help individuals to succeed in tasks that they cannot (or not as easily) accomplish alone.

1.5   Memory Collaboration and Interpersonal Cueing

One particularly well-researched form of collaborative cognition pertains to the domain of memory (e.g., Dixon, 2001). As will be outlined below in section 1.5.1, this line of research helped to inform the predictions for the present study. Among other questions, research on memory collaboration has investigated how the retrieval of a certain piece of information may be supported deliberately by another person. In the following, I will describe this research focus in more detail and outline how it is related to the present work. Subsequently, I will review possible performance gains from collaborating in memory tasks (section 1.5.2) and describe the boundaries that are associated with such collaboration (section 1.5.3).

1.5.1 The Relevance of Collaborative-Memory Research for the Present Study

A central interest in the present investigation pertains to the way in which collaborating persons tap each others' knowledge by *interpersonal cueing,* meaning that external stimuli provided by one person trigger mental representations in another person. This phenomenon has been investigated primarily in the context of memory research, where interpersonal cueing is framed as *external memory support* (e.g., Andersson & Rönnberg, 1997; Mäntylä & Göran-Nilsson, 1993). Interpersonal-cueing experiments investigate how well a person can elicit the memory of a given

piece of information in the partner by providing him or her with cues that are related to this memory. The respective study designs usually comprise an *encoding phase*, in which participants are asked to memorize pieces of information, and a later *retrieval phase*, in which they are asked to recall the previously presented information. Either one or both of these phases are carried out collaboratively with a partner. Research on collaboration in the *retrieval phase* helped to inform the predictions for the present investigation. As will be described below (in section 1.11 and part 2), participants in the present study were asked to provide cues for their partners to help them guess a target word. In contrast to typical memory experiments, participants did not memorize these target words in an earlier encoding phase. Instead, the stimuli consisted of common words that should be explained to the partner, tapping his or her stock of acquired knowledge about the target. This cued information retrieval may be considered similar to the phase of memory retrieval in interpersonal-cueing experiments. The analogies between typical interpersonal-cueing experiments and the present investigation with respect to the process of collaborative information retrieval helped to inform the predictions for the present investigation. A difference between the present, and former studies pertains to the process of collaborative information encoding which was not of central interest to the present dissertation.

In the next sections, I will review findings from the research on memory collaboration. These investigations have provided evidence for possible benefits from memory collaboration, but also showed that it may imply cognitive costs that set boundaries to the usefulness of such collaboration. First, I will focus on possible benefits from collaborating with another person in the memory domain.

1.5.2 Gains from Memory Collaboration

Memory collaboration is one of the most important forms of collaboration in everyday life (Dixon et al., 2007; Johansson et al., 2005; Martin & Wight, 2008). For example, a man may ask a colleague to remind him of a prospective event (such as an upcoming appointment), or he may use his wife's support when he is blocking on the name of a former schoolmate. Memory collaboration may be done either by pooling one's resources in an additive manner, complementary efforts, or via emergent processes that involve an entirely new competence due to the special dyadic or group setting (Dixon, 1996). In the following, I will consider possible general (i.e., age-independent) gains from such collaboration. After this, I will argue that memory collaboration may be particularly beneficial to older adults.

Collaborative memory is superior to individual performance. Memory performance of collaborating dyads or groups has been shown to be superior to that of solitary individuals (Dixon, 2001;

Gould, 2004; Stephenson, Kniveton, & Wagner, 1991). Even if others are only involved passively, this may affect memory performance: Another person's mere presence, if it is constant at both encoding and retrieval, may serve as a stabilizing factor within the cognitive environment of the individual, which may enhance memory performance (Reddy & Bellezza, 1983). Beyond this, collaborating on a memory task enables the individuals to engage in complementary labor division (Johansson et al., 2005; Wegner, 1986; Wegner, Erber, & Raymond, 1991) or additive resource pooling to succeed in the memory task (Andersson, 2001; Meudell, Hitch, & Kirby, 1992; Weldon & Bellinger, 1997). Supporting these considerations, research has repeatedly shown that collaborating dyads recall more correct items in experimental memory tasks than individuals do (e.g., Andersson & Rönnberg, 1995, 1996; Basden, Basden, Bryner, & Thomas III, 1997; Meudell, Hitch, & Boyle, 1995; Meudell et al., 1992). As compared to individuals, collaborating dyads also produce less false memories, presumably because they deploy better error-checking strategies than individual persons (Takahashi, 2007; Vollrath, Sheppard, Hinsz, & Davis, 1989; Yaron-Antar & Nachson, 2006).[1]

Increasing need for memory collaboration throughout adulthood. The domain of memory functioning is of vital importance in old age. Cognitive-mechanic abilities that contribute to individual memory performance (such as the speed of processing) decrease with age (Craik, 2000; Craik & Jennings, 1992; Light, 1991; Salthouse, 1991; Zacks et al., 2000). Older adults also subjectively perceive memory loss as one major cognitive challenge to their everyday functioning (Craik, 2000; Dixon et al., 2007). The literature suggests that memory collaboration may help to compensate for these aging-related changes and could therefore offer particular benefits to older adults (Dixon et al., 2007; Martin & Wight, 2008). Self-report data on older adults' compensatory memory strategies revealed that although collaborating with others is not perceived as the most frequent strategy used to improve one's memory performance, as compared to other strategies (such as investing more time and effort into a task; Dixon, de Frias, & Bäckman, 2001), collaborating with others in the memory domain is an integral phenomenon in older adults' daily lives and is perceived as enhancing individual memory performance when used (Dixon, Gagnon & Crow, 1998). Behavioral data has supported the assumption that collaborating dyads of older adults outperform older adults who work individually on recall tasks (for a review, see Martin & Wight, 2008). Moreover, one specific advantage of collaborative memory may be particularly salient in late adulthood: Collaborating has been found to reduce the frequency of false

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[1] Contradicting evidence is reported in the context of eyewitness reports, see Gabbert, Memon, and Allan (2003) who found that both in younger and in older adults, false memories related to a witnessed event increased after social influence.

memories, as compared to individuals' and nominal groups' performance. For example, Ross et al. (2004) asked older adults to memorize items on a shopping list. In the later recall phase, participants worked either individually, or in collaboration with their spouses. False memories were less frequent among collaborating spouses as compared to the added memories of individually working spouses. This suggests that collaboration may lead to more *reliable* memories, which is particularly valuable in old age (cf. Ross et al., 2004, 2008). In the face of aging-related decrements in memory performance, taking erroneously assumed memories for correct may be more detrimental to everyday functioning than the complete failure to produce a memory. In the case of complete memory failure, individuals will become aware of their deficits and can initiate attempts to correct for them (e.g., by asking other persons for their recall of an event, or by consulting their agenda to look up an appointment). In contrast to detected memory dysfunctions, false memories (implying the lack of doubt about the validity of a memory that is actually wrong) may not become detected at all and lead to behavioral errors that are executed with unwarranted confidence.

Taken together, older adults report that collaboration with others is a common and effective strategy to compensate for individual losses in memory performance, and this perception is supported by behavioral data. Older collaborating dyads have been found to produce (a) more correct and (b) less false memories than older individuals who work solitarily, and the latter advantage may be especially important in late adulthood. However, collaborating on memory tasks may also involve cognitive costs. These may reduce the effectiveness of collaborative performance. In the next section, I will describe these costs and the respective boundaries of memory collaboration.

1.5.3 Boundaries of Memory Collaboration

Although it offers potential benefits, collaborative cognition can also imply cognitive costs. Those drawbacks of collaborating may affect both younger and older adults, but may be particularly demanding for older adults. In the following, I will summarize general (i.e., age-unspecific) costs of memory collaboration as proposed by the literature. Subsequently, I will highlight why these costs of memory collaboration may pose a special cognitive challenge in late adulthood.

General boundaries of memory collaboration in adulthood. An important characteristic of collaborative work is that interacting dyads or groups typically fall short of their reasonable potential in many cognitive tasks, particularly in recall tasks. This has been demonstrated by comparing collaborating dyads' performance in free recall with that of *nominal* pairs (i.e., with the

pooled, non-redundant information recalled by two individuals who work on their own). These comparisons have revealed that collaborating dyads' performance does not exceed the pooled (i.e., added) performance of two individually working persons. To the contrary, collaborative memory performance has been repeatedly reported to even fall short of the pooled performance of nominal pairs (Andersson, 2001; Basden et al., 1997; Finley, Hitch, & Meudell, 2000; Johansson, Andersson, & Rönnberg, 2000; Weldon & Bellinger, 1997; Yaron-Antar & Nachson, 2006). This suggests that, although collaborative memory performance is found to be superior to that of a *single* individual, some of the potential of combining one's resources is lost in the interactive process, as indicated by the performance difference between nominal, and collaborating dyads (Andersson & Rönnberg, 1995, 1996; Basden et al., 1997; Weldon & Bellinger, 1997). This phenomenon has been referred to as *process loss* (Steiner, 1972) with respect to general collaborative phenomena. In the domain of cognitive performance, these costs of collaboration have been explained by *collaborative inhibition* (Weldon & Bellinger, 1997).

Process loss in collaboration has been ascribed to different interactive dynamics that are detrimental to the involved individuals' processing. As early as 1972, Steiner proposed that among other factors, motivational reasons could cause suboptimal collaborative performance. To date, the phenomenon of *social loafing* (i.e., the phenomenon that individuals invest less effort when working in teams than when working alone) has been discussed as one factor detrimental to collaborative performance in multiple tasks, among them cognitive tasks (Latané & Nida, 1981; Petty, Harkings, & Williams, 1980, Weldon & Gargano, 1988). Factors that may contribute to social loafing are diffused task responsibility, insufficient perception of the consequences of one's individual effort, and the fear of negative appraisal by others (Weldon & Bellinger, 1997). Another problem for collaborative cognition, for example, in the case of recall or brainstorming tasks, may be caused by the necessity of temporal interpersonal coordination. As only one partner can speak at a time, this prevents the partner from saying what he or she thinks. Accordingly, the partner has to keep the item in memory, and may have forgotten it by the time speaking is possible (*production blocking*, Diehl & Stroebe, 1987). In recall tasks, the partner's retrieval strategy may also be different from one's own strategy of remembering items, which can cause a person to forget information that he or she would have remembered if working independently (*retrieval strategy disruption,* Basden et al., 1997; Basden, Basden, & Henry, 2000; Finley et al., 2000).

In sum, collaborating in memory tasks does offer some adaptive potential for the involved individuals, as collaborative memory performance has been shown to be superior to that of persons working solitarily (Gould, 2004). However, there are also costs of collaborative remembering, as indicated by evidence on collaborative inhibition in collaborating dyads or

groups. This evidence suggests that the effectiveness with which interacting individuals pool their individual resources is often suboptimal.

Costs of memory collaboration may become more pronounced with age. Process loss in collaborative cognition reflects the difficulties of coordinating with the other person. This may impose particular demands on older as compared to younger collaborating adults: Costs of collaborating should be particularly detrimental for collaborative performance if people are working at the limits of their cognitive capacities. In line with findings on a decrease in working memory capacity in old age (Zacks et al., 2000), older adults' performance has been shown to be particularly fragile when it comes to handling complex task demands (cf. Hull, Martin, Beier, Lane, & Hamilton, 2008; Kray & Lindenberger, 2000; Lindenberger, Marsiske, & Baltes, 2000). Accordingly, reducing the complex demands of an interaction may be especially supportive for older adults. A central prediction in the present study was therefore that reducing interactive costs in a collaborative situation would decrease aging-related differences in cognitive performance.

1.6   General Research Question: How Can Collaborative Cognition Be Facilitated in Old Age?

To summarize the above considerations, collaborative cognition may offer particular benefits in old age. Collaborating with others to achieve a given goal may help older adults to compensate for aging-related losses in individual cognitive-mechanic skills. Although collaborating may be considered useful if compared to what a person may be able to achieve *individually* (Gould, 2004), it needs to be emphasized that collaborative cognition not only implies gains for the involved individuals. It also involves cognitive costs that can reduce the effectiveness of the collaboration. The complex processing demands that are posed by an interactive situation may particularly affect older adults' performance, as complex tasks are particularly challenging for older adults (cf. Hull et al., 2008; Kray & Lindenberger, 2000; Lindenberger et al., 2000).

From a developmental perspective, the general research question arising from these considerations was how collaborative cognition may be facilitated, and how this may be achieved for older adults in particular. In the present work, I suggested that two possible means may especially enhance older adults' collaborative performance: familiar partners' past experiences of collaborating with each other (*interactive expertise)*, and familiar partners' ability to refer to shared knowledge *(dyadic common ground).*

In the following section (section 1.7), I will review conceptual and empirical work on *interactive expertise*. This line of research suggests that two interaction partners' past experiences in interacting with each other may serve as a resource that enables them to optimize their collaborative performance. In section 1.8, I will introduce the concept of *dyadic common ground* as a specific facet of interactive expertise.

1.7 Interactive Expertise in Collaborative Cognition

It has been proposed that collaboration may be facilitated if the partners share collaborative experiences with each other. Persons who have collaborated with each other before are assumed to develop what Dixon (1999), drawing on propositions by Engeström (1992), has termed *interactive expertise*. This construct refers to the experience-based knowledge on how interactions with the particular partner can be optimized. Familiar persons may develop an elaborated representation of the partner's knowledge (e.g., Wegner, 1986; Wegner et al., 1991), be particularly skilled in reading the partner's nonverbal or paralinguistic signaling (such as facial expressions, eye contact, body postures, or intonation; e.g., Hollingshead, 1998a; Mazur, 2004), and know about the optimal interpersonal timing when communicating with him or her (e.g., Field et al., 1992). As a result, familiar partners are assumed to be able to interpret and anticipate the interaction partners' utterances and actions with greater accuracy and less cognitive effort. This may reduce the cognitive costs associated with the interactive process (e.g., Andersson & Rönnberg, 1995; Dixon, 1999; Karau & Williams, 1993). In the following, I will review research showing that interactive expertise may improve collaborative cognition.

1.7.1 Interactive Expertise Can Facilitate Collaborative Cognition

In the research on interactive expertise, two ways to operationalize this theoretical construct have been used: In one line of research, unfamiliar partners are repeatedly observed while they collaborate on a task. A second common approach compares real-life partners' performance to that of unfamiliar dyads in a given task. Below, I will elaborate in more detail on the rationale of these different operationalizations of interactive expertise. Empirical evidence from both traditions has mainly supported the suggestion that partners who have interacted with each other before outperform unfamiliar partners in collaborative tasks. In some studies, this is attributed to the interactive expertise *gained* among unfamiliar partners in the course of an experiment, and in other cases, to that which familiar partners had already *established* in their everyday lives (prior to the observed behavior in an empirical study).

Performance gains in unacquainted collaborators over time. The first mentioned line of research has investigated how unfamiliar dyads or groups gain interactive experience in a given task over repeated trials, thereby establishing a moderate form of mutual "familiarity." The performance gain of collaborating individuals (that cannot be explained by individual practice effects) is attributed to interactive expertise. For example, groups have been found to work together more effectively if they were trained together as a group, as compared to groups who had been trained as solitary individuals earlier on (e.g., Liang, Moreland, & Argote, 1995; Moreland, 1999; Moreland, Argote, & Krishnan, 1996, 1998). Similarly, Hupet, Chantraine, and Nef (1993) used a referential-naming task in which participants were asked to jointly arrange nonsense figures in a given order, which required them to describe the figures to each other. The authors report that the descriptions became more efficient the longer a dyad continued with the task, suggesting that interlocutors had established some kind of common language that facilitated mutual understanding (see also Clark & Wilkes-Gibbs, 1986; Pickering & Garrod, 2004).

Research on the familiarity effect. The second line of research mentioned above focused on the interactive expertise that familiar real-life partners (e.g., spouses, friends, or working colleagues) acquire in their daily lives. These studies operationalized the theoretical construct of interactive expertise by comparing familiar partners' collaborative performance in an experimental task to that of unfamiliar interaction partners' performance, mostly using a between-person design. Observed differences between the two experimental groups are attributed to the interactive expertise among familiar partners. Results from these studies have repeatedly shown that collaborative performance among familiar partners is superior to that of unfamiliar dyads or groups, an effect that has been referred to as the *familiarity effect* (e.g., Gould, 2004).[2] Often, those studies have focused on marriage partners. A recent study by Wight and Martin (2008) investigated older adults' individual, collaborative, and nominal-group performance in a problem-solving task. Participants in the collaborative condition worked with their spouses. As expected, the authors provide evidence for a superior performance of collaborating couples over individuals. Moreover, older couples in that study performed better than the nominal groups, indicating that something about older couples' collaboration implied a dyadic quality beyond the additive pooling of resources among spouses. This finding is particularly interesting, given the well-established finding that *unfamiliar* collaborating dyads usually do not outperform nominal dyads' performance (cf. section 1.5.3).

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[2] This term is only used for people that are familiar with each other in real life. It does not describe the effects of interactive practice that unfamiliar partners acquire in the laboratory.

Directly comparing familiar with unfamiliar partners, Wegner and his colleagues (1991) showed that intimate couples outperformed artificial dyads on a memory task. The authors suggested that the couples used an established *transactive memory system* (Wegner, 1986) that informed the partners about each other's area of expertise and allowed them to distribute the load of remembering pieces of information among themselves.[3] In a study by Johansson et al. (2000), older married couples' performance in a retrospective and a prospective memory task approached the performance of same-aged nominal groups *only* if couples claimed to engage in transactive memory. Older unfamiliar dyads, as well as older couples who reported that they had not used transactive memory, performed worse than nominal groups. Research conducted by Hollingshead (1998a, 1998b) provided evidence for a superior performance of intimate couples over unfamiliar partners in knowledge-pooling tasks, while this benefit depended on a complex of subtle and partly unconscious interpersonal processes among couples. The familiarity effect was reduced if the unconscious labor division among couples was disturbed (Hollingshead, 1998b), or their use of nonverbal and paralinguistic communication cues was prevented (Hollingshead, 1998a). In accordance with these results on interactive expertise among intimate couples, evidence for particularly skilled collaboration in collaborative memory tasks has also been reported for friends (e.g., Andersson, 2001; Andersson & Rönnberg, 1995, 1997), and for familiar co-workers (e.g., Hollingshead, 2000).

There is, however, also contrary evidence suggesting that familiar individuals' performance may sometimes not be superior, but rather comparable to that of unfamiliar dyads. Using a between-person design, Gould, Osborn, Krein, and Mortenson (2002) investigated couples' and unfamiliar dyads' collaborative performance in two collaborative-recall tasks. Participants were asked to recall a word list and a complex story, collaborating both at encoding and retrieval. In contrast to the authors' hypotheses, couples' performance in both tasks was comparable to that of unfamiliar dyads in any of the tasks. The unexpected lack of the well-established familiarity effect was also observed in a third task investigated by Gould et al. (2002). In this task, participants were asked to make their partners identify a nonsense figure based on their description. Initially, the authors had expected that familiar partners' shared knowledge would help them to create referents. However, familiar partners' performance was no different from that of unfamiliar partners. The authors emphasize that the task involved novel stimuli (abstract figures) which might have been too artificial for familiar couples to use their expertise in

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[3] This suggestion was supported by an experimental manipulation. The authors were able to reverse the familiarity effect if they assigned an artificial transactive memory system to the participants. Under this condition, the unfamiliar dyads outperformed the real-life couples, presumably because the experimental manipulation disturbed the couples' evolved habit of cognitive labor division.

the task. They speculate that if familiar couples were given a task in which they could more directly apply their previously established interactive expertise, this might result in different results. Research on the familiarity effect should therefore observe familiar partners' collaborative performance on tasks that are comparable to tasks that they work jointly on in their everyday lives. In the present study, this recommendation was considered when designing the experiment. I chose an operationalization of interactive expertise which is comparable to the above-reported studies on the familiarity effect. I investigated younger and older adults' collaborative performance on a dyadic-communication task completed once with their spouse, and once with an unfamiliar partner. The task simulated the everyday-life situation of communicating a piece of information to a communication partner.

In sum, theoretical considerations claim that the interactive expertise among familiar interaction partners would allow them to outperform unfamiliar dyads in collaborative tasks. Ample evidence supports this predicted familiarity effect. Given that partners' interactive practice can be transferred to the task at hand, various advantages may be associated with knowing one's interaction partner, such as overlapping knowledge, superior non-verbal communication, and interpersonal timing. However, findings from studies on the familiarity effect are partly divergent, and the effect can be reduced, erased, or even reversed under some experimental conditions. It therefore seems that the benefits of real-life interactive expertise can vary between familiar dyads, either because of external factors, such as the experimental task and the experimental stimuli, or because of the involved individuals' characteristics (Dixon, 1999; Gould et al., 2002). One person characteristic that may moderate the familiarity effect is the partners' age. In the following, I will describe why one might expect age differences in this effect and review the empirical evidence that is available on this issue to date.

1.7.2 Possible Age-Related Differences in the Benefits From Interactive Expertise

In this section, I will outline theoretical reasons for assuming an age-differential benefit of partners' familiarity for collaborative performance. These considerations suggest that older adults may profit more from being familiar with an interaction partner. I will also describe the few studies available that have addressed this question empirically.

Collaborating implies various demands caused by the interactive process. This involves monitoring the partner's utterances while planning one's own statements, updating of internal representations according to the partner's remarks, and switching one's attention between one's own and the partner's utterances (cf. Gould, 2004). Aging-related decreases in working memory capacity (Zacks et al., 2000) may impose special challenges to older adults when collaborating.

Researchers have proposed that reducing the interactive costs of collaborating may help to compensate for aging-related losses in performance (cf. Gould, 2004). Among other means to achieve such facilitation, interactive expertise with a familiar partner has been emphasized repeatedly as a possible special resource in older collaborating couples (cf. Amizita, 1996; Dixon, 1999, 2000; Johansson et al., 2005).

The theoretical claim that older adults' performance may profit more than that of younger adults if they collaborate with a familiar (as opposed to an unfamiliar) partner has hardly been addressed empirically. The evidence available on this question is scarce and divergent. In two studies by Dixon and Gould (1998), younger and older adults were asked to collaborate with a contemporary in remembering complex stories. In one study, participants collaborated with their spouse, and in the other, with an unfamiliar same-sex partner. Among unfamiliar dyads, younger dyads remembered more correct information from the stories than did older adults, reflecting age differences that can typically be observed in individual recall. However, when younger and older married couples performed in a comparable task, no age-related loss in performance was observed: Older spouses recalled as much correct information as did younger spouses. The authors speculated that this effect may be due to older couples' greater degree of interactive expertise (as compared to younger couples) which partners had acquired over the decades.[4]

In contrast to these results, there is divergent evidence provided by an already mentioned study (see previous section) by Gould et al. (2002). In this study, couples and unfamiliar dyads were tested in a series of collaborative tasks. The participants in this study belonged to two age groups (younger and older adults). As expected, younger adults outperformed older adults in all tasks. Unexpectedly, however, neither younger nor older couples performed any better than unfamiliar dyads from the same age group.

A note on the age–experience confound. The empirical work discussed above faces the challenge and limitation of an age–experience confound. In general, various forms of experience are correlated with age, such as the years of professional training or the life time shared with a close relationship partner. The association of chronological age with the duration of close relationships is not only a methodological problem when addressing possible age-differential benefits from interactive expertise, but it is also a conceptual quandary: Both processes – chronological aging

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[4] An important limitation of this research is that the study material for the two experimental groups (married couples and unfamiliar dyads) was not identical. Both experimental groups recalled complex stories that were structurally similar. However, not the same stories were used in both groups. As the authors point out, caution is therefore warranted when comparing the performance of these two experimental groups, as they may have been caused by differences in the experimental material.

and relationship development – are correlated with biological and normative social changes observed across the adult lifespan. I will revisit the confound of the lifetime shared with a close relationship partner and chronological age in the discussion (section 4.6).

1.7.3 Interim Summary on Interactive Expertise

In section 1.7, I have introduced the theoretical construct of interactive expertise, which describes comprehensive, experience-based knowledge about how interactions with a particular partner work best. This concept has been used to explain the familiarity effect, which describes the common finding that familiar interaction partners outperform unfamiliar partners in collaborative tasks. Although there is divergent evidence on the familiarity effect, the majority of studies suggest that interactive expertise among familiar partners may indeed facilitate collaboration, both in younger and in older collaborating adults.

Theoretical considerations furthermore suggest that interactive expertise may provide more support for older adults' than for younger adults' collaborative performance. Interaction is resource-intensive, and older adults may profit particularly if these complex demands are reduced through interactive expertise. Research investigating this proposition has yielded varying results: There is evidence that older adults may profit more from being familiar with their interaction partner, but also some evidence for a comparable effect of partners' familiarity on younger and older adults' collaborative performance. Little is known about the reasons for these varying findings. It is possible that characteristics of the experimental paradigms, such as their ecological validity, differentially allow younger and older adults to make use of their interactive expertise. The present study was conducted to provide further evidence on the question of a possible age-differential benefit from interactive expertise.

Beyond the question whether older adults profit more than younger adults from being familiar with their interaction partners, I was interested in a particular difference between unfamiliar and familiar interaction partners. Familiar partners may have elaborate mutual representations on the common ground they share. Among other experience-based interactive skills, this knowledge may help them in collaborative tasks. In the next sections, I will introduce the concept of dyadic common ground in detail and elaborate on how it may facilitate interactions among younger and older adults.

1.8   Knowledge-Related Interactive Expertise: Dyadic Common Ground

In the previous section, I introduced interactive expertise as an acquired ability, encompassing various facets of knowledge about how interactions with a particular partner work best. One special facet of this expertise is the common ground among partners, that is, the background knowledge which interaction partners share and can build upon in a conversation (Clark, 1985; Clark & Marshall, 1981). Research on dialogue has argued that without a minimal amount of common ground, communication is not possible at all because communicating a piece of information implies linking one's own knowledge to that of another person, which is not possible without a certain mutual overlap in the partners' representations of the communication target (Clark & Wilkes-Gibbs, 1986; but see Fiedler, 2008, for a critical account of this proposition). The present work focused on *dyadic* common ground, that is, the knowledge shared between two persons. In the following, I would like to outline how the concept of dyadic common ground will be defined in the context of the present study (section 1.8.1). After this, I will elaborate on how this shared knowledge may facilitate interactions among familiar partners (section 1.8.2) and derive possible age trajectories of its usefulness for collaborative performance from the literature (section 1.8.3).

1.8.1   The Concept of Dyadic Common Ground

Dyadic common ground has been conceptualized and investigated in various ways. On a broad level of definition, this term refers to the common knowledge of two persons, but suggested definitions greatly differ depending on the research context in which the term is used. The term was initially introduced to communication research by Clark and Marshall (1981) who conceived of this phenomenon as the mutual knowledge of two persons that may be applied to a conversation if a complex hierarchy of preconditions is met. First, two persons have to share some information that can be used in a conversation. Second, the speaker needs to realize this knowledge and assume that the other partner knows it, too. Third, the speaker then has to suppose that the listener knows that this knowledge is shared, and so on. In the present work, I used a more frugal definition as proposed by Wu and Keysar (2007). The authors suggest that common ground is present among two persons if both partners share a piece of information, and both persons are aware of sharing it.

In the following, I will outline the specific form of dyadic common ground as targeted by this dissertation. For this, I will highlight two aspects that are central to the present conceptualization of dyadic common ground: *dyadic idiosyncrasy* and *explicit use*. Following these

definitional notes, I will elaborate on how exactly and why using dyadic common ground may facilitate a conversation.

Idiosyncrasy. Dyadic common ground denotes the knowledge that two persons of a dyad share with each other. First of all, this implies a large stock of general knowledge about conventional behaviors and artifacts that may overlap among two persons who grew up in the same culture (e.g., Clark, 1996; Tomasello, 1999). Even unfamiliar persons can, to some degree, rely on language conventions (e.g., two English-speaking persons will know that the word "soccer" signifies a sport). They can also presuppose a broad stock of common cultural knowledge (e.g., both persons will know that a stadium is a place where people watch this game) and similarities in their culturally shaped biographies (e.g., most German people know that the last soccer world-cup contest was carried out in Germany). A second, less inclusive level of dyadic common ground may be shared among two persons who happen to be similar, for example with respect to their hobbies, religious affiliation, or age group. Because of these similarities, two people from the same social group might both hold a stock of more specific knowledge on a subculture (e.g., Clark & Marshall, 1981; Fussell & Krauss, 1992; Isaacs & Clark, 1987; Levine & Moreland, 1991). For example, two people interested in soccer might know what an offside position is, whereas other persons might not. Among familiar persons, this large stock of cultural agreements and subcultural knowledge is further supplemented by more exclusive pieces of knowledge that are not accessible to any random individual in the same culture or subculture. Rather, two familiar persons might also share knowledge that is derived from idiosyncratic experiences. For example, two players from the same soccer team may remember an occasion where the trainer forgot to bring the ball and the training had to be carried out with a volleyball. The idiosyncratic nature of this memory implies that it is exclusively shared by two persons, or at least that the access to this information is restricted to a defined number of persons who shared the experience as well, or who have been told about it. The framework of the present work focuses on this more exclusive type of dyadic common ground: In the present work, the term of dyadic common ground is used to refer to knowledge which is derived from *idiosyncratic past experiences* that are shared between two persons.[5]

Explicit use. When two familiar persons engage in a conversation, they may build on idiosyncratic dyadic common ground in various ways: First, they might *explicitly* name places, names of persons, or events that are related to their shared past experiences. Second, some

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[5] Due to the emphasis on shared *past* experiences, this definition diverges from alternative conceptions of common ground that also cover shared knowledged due to the physically shared, momentary environment among interaction partners (*copresence*, Clark & Haviland, 1977; Clark & Marshall, 1981).

references to the partners' dyadic common ground can become communicated *implicitly* because a common piece of cultural knowledge has a special, idiosyncratic meaning or salience for the two partners. For example, if two spouses engage in a conversation about a culturally normative event, such as high-school graduation, they might not explicitly mention any shared common knowledge among them that is related to this issue. However, if the couple's daughter graduated from high school only recently, or if this event was very special to the partners, talking about graduation may not only trigger *general knowledge* about the event that is readily available to members of a culture or subculture (e.g., behavioral scripts of the event). Instead, the partners' mental representations of a graduation can be similar because they are influenced by the spouses' shared idiosyncratic experience, which may emphasize particular aspects of the event and disregard other aspects. Without explicit mentioning, this implicit dyadic common ground can make *particular* aspects of the event especially accessible in the partners' memories when they talk about related topics. This accentuation of single memory fragments in the partners' minds may then be more pronounced than one would expect from the partners' broad cultural background.

As intrapersonal knowledge organization is complex, measuring implicit references to dyadic common ground in a reliable and non-speculative way from an observer's perspective is difficult, if not impossible. Therefore, I focused on the *explicit use of dyadic common ground* as the most conservative approach to investigating this phenomenon. That is, references to dyadic common ground were only considered as such in the present study if they were made explicitly by the participants, for example, if a private name, place, or event was mentioned. In part 2, I will describe how explicit dyadic common ground was assessed in the participants' utterances.

1.8.2 Dyadic Common Ground Can Facilitate Collaborative Cognition

It has been suggested above (section 1.7) that interactive expertise will enable interacting partners to shift the cost–benefit ratio of collaborative cognition. With the present study, I aimed at investigating one particular aspect of interactive expertise more closely, namely the partners' ability to use their dyadic common ground.

In the following, I would like to review some of the facilitative effects of using dyadic common ground for communication suggested by the literature on *interpersonal cueing*. This line of research investigates how a person's memory performance can be supported by another person's provided cues which are supposed to help retrieve a memory trace for some encoded information. This task is similar to an everyday-life situation in which one person wishes to communicate an idea to an interlocutor: The cueing person is equipped with some information that he or she needs to communicate to the naïve listener. For example, a man may ask his wife

to pass him a glass of jelly from a crowded breakfast table. To communicate this idea, he needs to describe the content, the color, or other characteristics of the item. Both in real-life conversations and in controlled cueing experiments, the achievement of this communication goal depends on how successfully one person links his or her knowledge to the assumed knowledge of the partner. This implies identifying referents that the partner can also relate to (Krauss & Fussell, 1990). The literature suggests that interpersonal cues that use dyadic common ground offer at least three major advantages for communication, and, in turn, for collaborative remembering by communicative means: common ground cues are *effective, efficient,* and *easy to process.*[6] In the following, I will to summarize the rationale and empirical evidence for these three suggested advantages of dyadic common ground.

Dyadic common-ground cues are effective. Dyadic common-ground cues are supposed to help another person to activate a particular mental representation by means of references to mutually shared, *idiosyncratic* pieces of knowledge. Idiosyncratic cues have been shown to be more effective than non-idiosyncratic cues. According evidence was first reported from studies on individual cueing and recall, where people were asked to generate semantically related cue words for a list of items. Those items were to be remembered later, and this recall phase was supported by the previously generated cues. Evidence from a number of such studies has shown that self-generated cues are particularly helpful when memorizing new material (Bäckman & Mäntylä, 1988; Mäntylä, 1986, 1994; Mäntylä & Göran-Nilsson, 1983, 1988). It has been suggested that self-referential information is associated with a particularly well-defined memory structure (Bower & Gilligan, 1979). Mäntylä (1986) elaborated in more detail on why self-generated cues are especially effective. He suggested that they provide two preconditions for successful cueing: First, those cues are *compatible* with the memorized information (i.e., they are subjectively associated with some features of the memorized information, Tulving & Thompson, 1973). Second, they are *distinct* in that they uniquely trigger a particular piece of memorized information (Eysenck, 1979; Watkins & Watkins, 1975).

One may also apply these two principles – compatibility and distinctiveness – to interpersonal cueing processes. Familiar partners can use their convergent memory traces to enrich their cueing with idiosyncratic information that will be interpretable for both partners.

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[6] In the previous section, I have explained that I use the term of dyadic common ground for the knowledge that two familiar partners share based on their common *idiosyncratic* experiences. It should be noted that the literature on interpersonal cueing mostly draws on a broader conceptualization of dyadic common ground. Here, common ground usually denotes the *overall stock of common knowledge* among interaction partners, including non-idiosyncratic knowledge such as cultural or subcultural conventions. *Idiosyncratic* dyadic common ground can be considered a special subset of overall common ground. Therefore, I assume that the findings from the literature on interpersonal cueing and common ground may also be valid for *idiosyncratic* common ground.

Idiosyncratic cues that tap two persons' past knowledge may be particularly effective because the two persons can intuitively relate such a cue to some unique memorized information (e.g., Wegner et al., 1991). Studies on interpersonal cueing have supported the idea that familiar persons are especially skilled in providing effective cues for each other. In those studies, more correct items were recalled from a previously studied list if memory cues were provided by a familiar person (e.g., a friend or the spouse), than when participants were provided with unfamiliar partners' cues (Andersson & Rönnberg, 1997; Fussell & Krauss, 1989). Andersson and Rönnberg (1997) reported that befriended persons were even better than unfamiliar dyads to *guess* certain targets based on interpersonal cues (i.e., without having studied these targets in an earlier encoding phase).

Dyadic common-ground cues are efficient. It has been outlined before that dyadic common-ground cues may be particularly effective in that they distinctively trigger a particular piece of memorized information. Besides this advantage, dyadic common ground may enable partners to be more efficient in their cueing, that is, to use short and frugal abbreviations in order to express complex pieces of information. According to *grounding theory* (Clark, 1996), interacting persons successively negotiate a mutually agreed meaning of communicative signals. This process is assumed to unfold across the circumscribed course of a conversation, over the course of a private acquaintanceship, and also within larger entities such as social groups or societies. It has been assumed that the main reason for people to spontaneously engage in creating these abbreviations is the anticipated saving of resources and creation of mutual understanding at the lowest costs (Clark & Brennan, 1991; Clark & Wilkes-Gibbs, 1986; Hupet & Chantraine, 1992).

Grounding (i.e., successively establishing common ground) can facilitate communication because people can use previously negotiated, short cues instead of repeatedly elaborating on complex issues. For example, a woman asking her husband, "Can you pick up my dress?," builds on the couple's previously established understanding about the location of the dry cleaner's where the partners usually bring their clothes. Creating common ground may therefore pose an adaptive process when collaboration is necessary, particularly if saving resources is important.

Some studies that have addressed the effect of common ground on collaborative performance used the number of words, phrases, or conversational turns as a proxy for the effort that is required to succeed in a communicative task. Referential-communication tasks (for an overview of those tasks, see Yule, 1997) have been used to demonstrate the increasing efficiency among interlocutors over time. In these experiments, participants are provided with ambiguous stimuli (e.g., nonsense figures) and are asked to make an interlocutor identify those stimuli based on their verbal descriptions (i.e., their cues). Evidence from these studies demonstrates that, over

repeated trials, people negotiate a mutually shared interpretation of the provided stimuli. This process successively results in abbreviated expressions for the stimuli that enable the partners to communicate more efficiently (e.g., Clark & Wilkes-Gibbs, 1986; Galantucci, 2005; Garrod & Doherty, 1994; Pickering & Garrod, 2004; Wu & Keysar, 2007).

Research on the efficiency that may be gained through using dyadic common ground has also investigated the benefits of already established shared knowledge in the context of a specific novel situation (i.e., some form of grounding that has taken place before the observed interaction). For example, Isaacs and Clark (1987) could show that people living in New York were more efficient in describing a route across New York to other New Yorkers who shared local information with them. With local citizens, people referred to the names of buildings (as they presupposed that these names were familiar to the interlocutor), while they gave more complicated descriptions of the buildings when talking to a stranger. Similar results were reported by Kingsbury (1968; cited after Fussell & Krauss, 1989) who asked pedestrians on the street for directions in Boston. He informed some subjects that he was from out of town, and others, that he was a local. People needed fewer words to explain the route if they assumed that the experimenter was a local.

These findings suggest that in-group membership provides speakers with information about shared knowledge that can be used to abbreviate the communication process. This effect should be expected for close social partners in particular, but hardly any empirical evidence on this assumption is available to date.

Goodman and Ofshe (1968) investigated married couples, engaged couples, and unfamiliar dyads in a collaborative-communication task in which one person was asked to provide the partner with a single-word cue so that he or she was able to guess a target word. The authors investigated the *number of wrong guesses* taken by the listening partner as a measure of communicative efficiency (as partners took turns in uttering one-word messages, the number of wrong guesses taken by the listener equaled the number of cues provided by the speaker minus one). No differences in communicative efficiency were observed between the three subsamples in the overall set of targets that partners had to guess. However, differences between the three subsamples of couples and the unfamiliar dyads were found when partners explained family-related words to each other.[7] Here, the least wrong guesses were taken among married partners before guessing the target word. More wrong guesses were taken among unmarried couples, and the greatest number of wrong guesses was produced among unfamiliar dyads. The authors

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[7] Family-related words in this study were: Birth, family, hospital, house, in-laws, and marriage.

suggest that couples used shared knowledge from their family lives to create optimal referents (an assumption that was, however, not explicitly tested in this study). They furthermore speculate that the differing performances between married and engaged couples may be due to married couples' longer relationships.

Fussell and Krauss (1989) reported results that are partly divergent from those reported by Goodman and Ofshe (1968). The authors predicted that familiar students would produce *shorter messages* to cue each other in a referential-naming task, as compared to unfamiliar students who prepared cues for each other. Contrary to this hypothesis, the authors found no differences in the lengths of the utterances between familiar and unfamiliar dyads although messages among familiar partners were found to support memory retrieval more reliably, as compared to messages among unfamiliar participants. The authors note that this study included acquainted dyads (not close friends), whose conversations may rather be comparable to unfamiliar persons' conversations than to those of close social partners (cf. Hornstein, 1985), and that the unfamiliar dyads in their study shared a large stock of less exclusive common ground due to their category membership (all participants were students at the same university). They speculated that if the level of acquaintance had differed more clearly between the compared groups, results might have been more in line with their hypothesis.

In sum, the literature suggests that interlocutors' similarities associated with in-group membership allow for more efficient verbal communication (Isaacs & Clark, 1987; Kingsbury, 1986). This logic was extended to marriage partners and familiar students (Fussell & Krauss, 1989; Goodman & Ofshe, 1968), providing varying results. This ambiguity may be due to the greatly varying degrees of acquaintance among the familiar partners observed in these studies. When designing the present study, I took this consideration into account by comparing very dissimilar levels of acquaintanceship (cohabiting couples vs. unfamiliar dyads).

Dyadic common ground is easy to process. Dyadic common ground taps the interaction partners' overlapping *idiosyncratic* knowledge. Besides the advantages of increased effectiveness and efficiency of these type of cues, processing the according information will be relatively resource-inexpensive, both for the speaker and the listener. Familiar knowledge is known to be processed with less cognitive effort than novel information, as the latter requires more self-initiated processing (Craik, 1994; Craik & Jennings, 1992). Dyadic common ground refers to each involved individual's *familiar* knowledge. Therefore, it should allow for a more favorable resource situation, as compared to situations in which *novel* information has to be processed by any of the partners.

It has been suggested that people generally (and independent of the partners' familiarity) engage in *audience design* (e.g., Clark & Murphy, 1982) or *audience tuning (*Higgins, 1992) when talking to another person, meaning that they tailor their messages to the listener's assumed knowledge. It has been proposed that this requires the speaker to take into account the listener's perspective (Clark 1985; Clark & Marshall, 1981; Mead, 1934). One could assume that retrieving knowledge from one's own memory that is shared with the listener, and that will make for good cues, may be resource demanding. However, using shared idiosyncratic knowledge might not even require a person to take the other person's perspective. Instead, it may allow for a most simple heuristic: The speaker may just rely on his or her own knowledge when formulating a statement (*knowledge overlap heuristic*, Wu & Keysar, 2007).[8] Given a substantial amount of overlap in the partners' knowledge, the speaker's knowledge is likely to correspond to that of the partner. This heuristic of using one's own idiosyncratic knowledge is less resource-intensive than modeling the interaction partner's state of knowledge as a separate entity, and it is assumed to work effectively given a sufficient stock of shared knowledge among the interaction partners (Gigerenzer & Goldstein, 1996; Pickering & Garrod, 2004).[9] Using dyadic common ground may therefore save cognitive resources that can be invested into the cognitive task. This advantage is particularly interesting from a developmental perspective, as older adults have less cognitive-mechanic resources at their disposal than younger adults when they carry out a complex cognitive task. The following section will address possible age trajectories of the effect of using dyadic common ground on collaborative performance.

1.8.3 Possible Age-Related Differences in the Benefits From Using Dyadic Common Ground

Age-related differences in the beneficial effect of dyadic common ground on collaborative cognition have, to my knowledge, not yet been addressed empirically. They seem plausible when consulting two major strands of research: That on age trajectories of memory functioning, and that on age-related differences in perspective taking. The arguments for an age-differential benefit from the use of dyadic common ground as they may be derived from these two lines of research will be described in the following.

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[8] Compare Clark & Marshall (1981) for a more basic account of this idea with respect to accumulated mutual knowledge in the course of a conversation (*linguistic copresence heuristic*).
[9] As people tend to overestimate the degree of knowledge that they share with another person (Krauss & Fussell, 1991), it is important to acknowledge that this heuristic may fail if the knowledge overlap between two interlocutors is insufficient. For an overview of research on this fallacy, see Nickerson (1999).

Dyadic common ground may act as environmental support, thereby reducing the necessity of self-initiated retrieval. As has been outlined above, dyadic common-ground cues may, in general, be effective, efficient, and easy to process. This effect may be even more pronounced in older as compared to younger adults. Craik (1994) has described remembering as an interaction of incoming stimuli with stored past experiences that have already been integrated into a person's stock of acquired knowledge about the world. According to this view, retrieval can be conceived of as the process that recapitulates the original pattern of encoding activity, which involves some form of either internal, or environmentally supported cueing (e.g., James, 1904; Tulving, 1983). If environmental support is scarce, more self-initiated processing is required to recapitulate the stored knowledge. Craik (1994) suggests that aging-related decrements in memory performance in a given task can be explained by the degree to which the person needs to engage in self-initiated processing, which seems to be particularly demanding for older adults (see also Craik, 2000; Craik & Jennings, 1992). The notion of an age-differential benefit from environmental support when recalling encoded information has also been shown empirically. Older adults' performance profits particularly if cues are provided both at encoding and at retrieval (Craik, Byrd, & Swanson, 1987). Moreover, it has been found that age-related differences in recall performance among younger and older adults can be reduced if participants use idiosyncratic cues to support their own memory retrieval (Bäckman & Mäntylä, 1988). This suggests that recall performance may be particularly optimized in older adults if external memory support is provided that economically taps older peoples' familiar, crystallized knowledge, and thereby delivers older adults' cognitive system from self-initiated processing. Dyadic common-ground cues may serve as such a facilitative tool in collaborative remembering: They tap the person's idiosyncratic, well-integrated, and familiar knowledge, which is easy to process, both for the speaker and for the listener in a conversation.

Dyadic common ground may alleviate older adults' need for perspective taking. Besides considering age-specific memory changes in adulthood, I will now elaborate on the demands of perspective taking involved in interpersonal communication that may be particularly sensitive to aging. Speaking to a person without using dyadic common ground requires the speaker to take into account the interlocutor's knowledge about an issue (Clark & Murphy, 1982; Krauss & Fussell, 1990). In more detail, I suggest that this implies a hierarchy of mental operations. The speaker has to (1) realize that his or her own state of knowledge may be different from the listening partner's knowledge, (2) suppress his or her own knowledge about the communication goal, and (3) infer the partner's state of knowledge. Building on this, the speaker then has to (4) retrieve from his or her own memory pieces of knowledge that are both suitable for communication of

the desired information and that are also assumed to be comprehensible to the partner, given his or her assumed state of knowledge.[10] These complex mental operations are related to lines of research on perspective taking (i.e., the ability to take another person's point of view) and Theory of Mind (i.e., understanding the thoughts and feelings of others). Evidence suggests an aging-related decline both in perspective-taking competencies (e.g., Inagaki et al., 2002; Kemper, Othick, Warren, Gubarchuk, & Gerhing, 1996; Ligneau-Hervé & Mullet, 2005) and performance in Theory-of-Mind-related tasks (e.g., McKinnon & Moscovitch, 2007; Slessor, Phillips, & Bull, 2007; Sullivan & Ruffman, 2004) with advancing adult age.[11] However, as has been argued above (in section 1.8.2), the complex hierarchy of skills associated with perspective taking in communication might not be necessary if the partners use dyadic common ground. If two partners' knowledge partly overlaps, the speaker may just rely on his or her own idiosyncratic knowledge when formulating his or her remarks (e.g., Wu & Keysar, 2007). Cues using such knowledge will be easily retrievable from the speaker's memory, and might also be easily understood by the listening partner. This can reduce the demands of perspective taking, which have been suggested to be particularly resource-intensive for older adults. Using dyadic common ground might therefore bring about a special facilitation for collaborative performance in late adulthood.

1.8.4 Interim Summary on Dyadic Common Ground

In section 1.8, I have explained that knowing one's interaction partner may, among other benefits, imply a particular advantage in that the partners can rely on previously established dyadic common ground. Research has shown that two persons who share information with each other communicate both more effectively and more efficiently. This may be even more beneficial for older adults than for younger adults: Dyadic common ground offers environmental support for recapitulating familiar patterns of cognitive activation and can thereby reduce the necessity to engage in self-initiated processing. Older adults are assumed to profit particularly from such facilitation when retrieving information. Moreover, the option to fall back on dyadic common

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[10] This conceptualization was informed by previous research done by Clark (1992), Clark & Murphy (1982), Fussell & Krauss (1992), and Nickerson (1999), who emphasized single components of the suggested hierarchy of operations.

[11] Some studies on Theory-of-Mind-related tasks have also provided evidence for an equivalent, or even superior performance in older as compared to younger adults (e.g., Happé, Winner, & Brownell, 1998; MacPherson, Phillips, & Della Sala, 2002). Preserved skills or age-related gains in the complex skills that are subsumed under Theory-of-Mind skills seem possible if the task involves judgments about social rules, for which older adults can draw on their acquired cultural knowledge. In contrast, more basic inferences (e.g., about the interaction partner's state of knowledge on a specific topic) may be determined to a greater degree by age-related decrements in mechanic components of intellectual functioning.

ground can deliver the speaker in an interaction from the demands of perspective taking that seems to be particularly demanding older adults. As compared to perspective taking, it might be less resource-intensive to use one's own personal knowledge when planning a statement. In the case of sufficient knowledge overlap among partners, this will be interpretable to the listening partner as well. Cueing each other with dyadic common ground when collaborating on a memory task can therefore help to overcome two special aging-related challenges to collaboration and may thus be particularly helpful for older adults. However, no evidence is available to date that directly tests this prediction. One of my central goals in the present investigation was to investigate this theoretically warranted assumption.

1.9   Research Questions and Hypotheses

In the following sections, I would like to summarize the current state of knowledge about the role of partners' familiarity and of dyadic common ground for collaborative performance and highlight the central questions that have not yet been answered by past research. I have reported on research showing that familiar partners tend to perform better than unfamiliar partners in collaborative tasks. This effect has been referred to as the familiarity effect and is interpreted as a result of the partners' past interactions that provide them with interactive expertise. Research on the familiarity effect has raised at least two open questions that have inspired the present dissertation.

First, age differences in the familiarity effect have been theoretically assumed, but rarely addressed empirically, and the pattern of available evidence is diverse. In the present work, I therefore went beyond comparing familiar and unfamiliar interaction partners' performance, and addressed possible age differences in this regard.

Second, little empirical evidence is available about what exactly makes collaboration easier if one is familiar with the interaction partner. Furthermore, age differences in the contributions of various facets of interactive expertise (such as the opportunity to use dyadic common ground with the familiar partner) to collaborative performance seem theoretically plausible, but have not yet been addressed empirically. The present study was conducted to investigate these open questions. In the following, I will specify those questions and derive the hypotheses for the present dissertation.

1.9.1   Research Question 1: Do Older Adults Profit More From Interactive Expertise Than Younger Adults Do?

Interactive expertise can facilitate collaboration. In many past studies, interactive expertise was operationalized by comparing familiar partners' collaborative performance to that of unfamiliar partners, assuming that familiar partners in the laboratory could make use of the interactive expertise that they developed in real-life situations. The large majority of these investigations showed that familiar partners outperform unfamiliar collaborators (e.g., Andersson, 2001; Andersson & Rönnberg, 1995, 1997; Johansson et al., 2000; Hollingshead, 1998a, 1998b, 2000; Wegner et al, 1991). Less is known about age differences in the familiarity effect. Theoretical considerations suggest that being familiar with the interaction partner may be more beneficial for older than for younger adults' collaborative performance, as this reduces interactive costs that may affect older adults particularly (cf. Amizita, 1996; Dixon, 1999, 2000; Johansson et al., 2005). Empirical evidence on this prediction is scarce and diverse. There is support for the prediction of an age-differential benefit from interactive expertise (Dixon & Gould, 1998), but also evidence for a comparable benefit for younger and older adults' collaboration (Gould et al., 2002). Further research is needed to understand this divergent pattern of results, which raised the first research question for the present study: Do older adults profit more than younger adults from interactive expertise?

From the literature on lifespan trajectories of cognitive functioning and that on interactive expertise, I made the following two predictions: First, both younger and older adults' collaborative performance will profit from interactive expertise. Second, this beneficial effect will be more pronounced in older as compared to younger adults.

In section 1.12, I will build on these general predictions when describing the according specific hypotheses for the empirical investigation.

1.9.2   Research Question 2: Do Older Adults Profit More From Using Dyadic Common Ground Than Younger Adults Do?

Interactive expertise is conceptualized as a comprehensive set of acquired abilities when interacting with a particular partner. However, little is understood about the role of various advantages that are associated with these comprehensive skills. One goal of the present research was to identify a specific, meaningful facet in this regard and to investigate its contribution to collaborative performance. I focused on the knowledge that two collaborating persons have in common as a function of their shared past experiences, which can be used to facilitate an

interaction. Evidence suggests that the subcultural knowledge shared by two interlocutors enables them to be more effective and more efficient in their communication (Isaaks & Clark, 1987; Kingsbury, 1968), and this has also been shown for the type of idiosyncratic common ground which is of interest in the present dissertation (Fussell & Krauss, 1989; Goodman & Ofshe, 1968).

Using dyadic common ground may be even more beneficial for older adults' collaborative performance as compared to that of younger adults. If dyadic common ground is used in a conversation, this offers two major advantages that may particularly support older adults' cognitive functioning: It can reduce the necessity to engage in self-initiated processing (cf. Craik, 1994, 2000), and it may reduce the need to take the other's perspective because dyadic common ground pertains to knowledge that is shared among the interlocutors (cf. Wu & Keysar, 2007). Both operations are assumed to be more demanding for older than for younger adults (cf. Craik, 1994, 2000; Ligneau-Hervé & Mullet, 2005; Slessor et al., 2000; Sullivan & Ruffman, 2004). However, no empirical evidence is available to date that directly tests the prediction that dyadic common ground may enhance particularly older adults' collaboration. Therefore, the second research question for the present investigation was: Do older adults profit more than younger adults from using dyadic common ground?

From the review of the literature, I made the following two predictions regarding the effect of dyadic common ground on collaborative performance: First, using dyadic common ground will enhance collaborative performance – both in younger and in older familiar partners. Second, the effect of dyadic common ground on collaborative performance will be greater in older than in younger adults. In section 1.12, I will describe the specific hypotheses for the empirical study that are related to these general predictions.

1.10 Requirements of the Empirical Paradigm

To address the above-described hypotheses on interactive expertise and dyadic common ground empirically, a new experimental paradigm was developed. In the following, I will describe the multiple requirements that I derived from related research and took into consideration when designing the experiment.

Former studies on age trajectories of the familiarity effect and the usefulness of shared knowledge in communication yielded inconsistent results. In particular, both the claim of a familiarity effect, and the question of a greater benefit from partners' familiarity in older adults (as compared to younger adults) has not been supported consistently by empirical evidence. Among other factors, these divergences may have been due to variations in the paradigms used in

past studies (cf. Gould, 2004). I suggest that it might be important to use a paradigm that allows familiar partners to apply their interactive expertise from their everyday lives to the task in a rather direct and unaltered manner. Considering this may be especially important when designing age-comparative studies, as younger and older adults' performance might respond differentially to changes in contextual factors (cf. Rybash, 1996). I implemented this demand by designing an experimental task that modeled an everyday-life situation from the domain of interpersonal communication. This important domain of interactive expertise is trained frequently and across various interactive situations in familiar partners' everyday lives. I therefore assumed that interactive expertise in the domain of communication may be a comprehensive competence that is more readily applicable to an experimental task, as compared to more specific forms of interactive expertise (e.g., how to collaborate when fixing a broken bike). It also seemed advisable to compare the performance of collaborating persons with very high expertise (such as cohabiting couples) to that of unfamiliar persons. This would provide a situation in which the availability of interactive expertise strongly differs (cf. Fussell & Krauss, 1989).

The second research question in the present study was how dyadic common ground may support younger and older adults' collaborative performance. Addressing this question required observing the use of this cueing strategy with sufficient variance in the investigated sample, and quantifying this use reliably. Therefore, investigating the questions that were at the focus of the present work made several demands on the paradigm. First of all, an experimental within-person approach seemed particularly suitable. This would make it possible to (a) directly compare younger and older adults' collaborative performance, (b) vary the interaction partners' familiarity within persons, (c) manipulate the likelihood of participants' use of dyadic common ground, (d) decompose the *potential availability* of dyadic common ground from its actual *use* and its *effect* on collaborative performance, and (e) keep factors of minor interest maximally constant across groups and conditions.

The present work was informed by the notion of the *multidimensionality* of human development (i.e., the proposition that multiple dimensions in a given domain of functioning may feature gains and losses in any phase of life; P. B. Baltes et al., 2006). The corresponding theoretical distinction between cognitive mechanics and cognitive pragmatics (e.g., Lindenberger & Baltes, 2000) influenced the choice of the experimental paradigm for the present study. It has been suggested that older adults may use their acquired skills to compensate for losses in cognitive-mechanic skills (Bäckman & Dixon, 1992; Marsiske et al., 1995). Accordingly, older adults may be able to master interactive situations despite novel task affordances if they can fall back to established pragmatic competencies. Studies on older adults' collaborative performance at

zero acquaintance showed that older adults have difficulties in newly *establishing* interpersonal specializations in the form of interactive expertise and dyadic common ground (Horton & Spieler, 2007; Hupet et al., 1993; Kemper et al., 1996). It was therefore considered important to choose an experimental task that (a) implied mechanic-cognitive demands and that (b) allowed older adults to use their *pragmatic* skills (i.e., their established interactive expertise, and their accumulated dyadic common ground) to succeed in the task.

The advantages offered by a well-controlled experimental setting, and the trade-off with ecological validity were extensively considered when designing the experiment. The experimental task needed to be ecologically valid enough to model communication like it occurs in real life. Moreover, the goal of the study was to model how communication varies as a function of interactive expertise and dyadic common ground, and the outcome measure needed to be meaningfully related to real-life communication outcomes.

1.11   Chosen Experimental Paradigm: The Taboo Task

In this section, I will provide a preview on the experimental paradigm that was developed based on the above considerations. I will introduce it briefly to prepare the ground for the specific hypotheses that I made for the investigation. The paradigm and research design will be described in more detail in part 2.

Younger and older cohabiting couples were chosen as subjects for the present investigation. The experimental task was to explain target words to an interaction partner. Based on the cues provided by the explaining person, the listening person's task was to guess those targets. The explaining person was instructed to use as few words as possible to cue the partner.

Using this paradigm, I investigated age-differences with respect to three main constructs: collaborative performance, interactive expertise, and dyadic common ground. These theoretical constructs were operationalized for the empirical investigation as follows.

Collaborative performance. Drawing on prior research on interpersonal cueing, verbal efficiency was taken as an indicator of collaborative performance (cf. Pickering & Garrod, 2004; Wu & Keysar, 2007; Yule, 1997). In the present study, this was determined by an external coding of the number of words required by the explaining partner until the listening partner gave the correct answer (i.e., until the target word was guessed by the partner). This measure reflected both partners' contribution to task performance in that it depended on the efficiency of the explaining partner's cueing, and also on the listening partner's competencies to decode the provided information after a minimum of received cue words. In sections 2.6.1 and 2.6.2 in the

Methods part, I will describe the rationale for choosing this measure as an indicator of collaborative performance and the coding procedure in detail.

Interactive expertise. The opportunity to use previously established interactive expertise with the interaction partner was operationalized by a within-person variation of the interaction partner. Each participant carried out the task (a) with the spouse or real-life partner and (b) with an unfamiliar partner. I assumed that cohabiting couples should have acquired comprehensive interactive expertise in their daily lives. The experimental paradigm simulated the verbal exchange of information between interaction partners as it might occur in everyday life. Close real-life partners should therefore be experienced in this frequent, everyday process of exchanging information. In contrast, I expected that unfamiliar partners in the study would entirely lack any kind of interactive expertise, as special care was taken to ensure that the unfamiliar partners in the study had never interacted with each other before. Of course, interactive expertise could also be established among unfamiliar partners in the course of an experimental setting (Kenny, Kashy, & Cook, 2006). I assumed, however, that the course of only twelve short verbal messages per partner would not be sufficient to build up an interactive expertise comparable to that of long-term partners.

Dyadic common ground. The likelihood that dyadic common ground was used among cohabiting couples was assumed to be altered by two factors.

The present work conceptualized dyadic common ground as the knowledge that two people derive from idiosyncratic experiences they have shared or communicated to each other. Therefore, the interaction partners' familiarity was assumed to be a crucial prerequisite for the use of dyadic common ground. The likelihood with which spouses used dyadic common ground in their cueing was manipulated by a systematic variation of the target words. These were varied with respect to their reference to cohabiting couples' everyday lives. The dimension of everyday-life reference was empirically determined by an independent word-rating pre-study, which I will describe in part 2. I assumed that long-term partners were more likely to mention shared knowledge if the target was closely related to their daily lives. Compared to this, more exotic words (that couples rarely encounter or talk about in their shared everyday lives) should not offer this opportunity to the same degree. This variation was included to enlarge the variance in the use of dyadic common ground in the sample.

After the study, the use of dyadic common ground in participants' cueing was determined by an external coding. In the Methods part, I will describe the coding procedure in detail (section 2.6.1).

1.12   Specific Hypotheses for the Present Study

The *general research question* of the present work was how collaborative cognition may be facilitated to optimally support older adults' collaboration. The presented research paradigm was chosen to investigate two more specific research questions in this regard. They pertain to familiar partners' past experiences of collaborating with each other *(interactive expertise)*, and to familiar partners' ability to use shared knowledge in their interactions *(dyadic common ground)*. In the following, I will describe the according specific predictions that I made for younger and older adults' performance in the experimental task.

1.12.1 Main Age Differences in Collaborative Performance

The experimental task required a complex range of subtasks that I will describe in the following. Participants needed to process the information provided by the partner (i.e., integrate it into their own stock of knowledge; cf. Clark, 1986; McClelland, McNaughton, & O'Reilly, 1995). In the case of insufficient knowledge overlap among partners, the task furthermore required taking the interlocutor's perspective (e.g., Clark & Murphy, 1982; Krauss & Fussell, 1990). This, I suggest, will imply realizing one's own and the interlocutor's knowledge (and acknowledging possible differences), suppressing one's own knowledge, and inferring the partner's state of knowledge (see section 1.8.3).

The sum of these requirements is likely to impose a greater challenge to older than to the younger adults, as sensory functioning and the speed of basic cognitive processing decrease in late adulthood (e.g., Craik & Jennings, 1992; P. B. Baltes & Lindenberger, 1997; Salthouse, 2000; Tesch-Römer & Wahl, 1996). Moreover, a number of changes in communicative behavior have been observed in normal aging, and these are likely to be manifested in the present experimental task as well. For example, older adults have been reported to communicate less efficiently (Gould & Dixon, 1993; Shewan & Hendersen, 1988). In line with aging-related declines in the ability to inhibit unwanted or task-irrelevant information (Dempster, 1992; Hasher, Zacks, & May, 1999), off-target verbosity (as defined by abundant speech and a lack of focus) has been found to be more frequent in older than in younger adults' speech (Gold, Andres, Arbuckle, & Schwartzman, 1988; Pushkar et al., 2000). I assumed that these aging-related changes would be similar for the sample investigated in the present study, and therefore expected that this would create a main difference in the dependent measure of interest (the number of words participants need to cue their partners). Therefore, I assumed that younger participants would generally perform better than the older participants, irrespective of the interacting partners' familiarity. These predicted

age differences in performance were not at the focus of interest in the present study. Rather, this expected pattern of results served as the basis for investigating the hypotheses that I addressed with the present investigation. In section 1.9, I made general predictions for the effects of interactive expertise and dyadic common ground on younger and older adults' collaborative performance. In the next two sections, I will specify these general predictions with respect to the measures in the present study.

1.12.2 Hypothesized Effects of Interactive Expertise on Collaborative Performance

As outlined in section 1.9, the first research question was informed by literature on interactive expertise. Previous conceptual and empirical research has provided evidence that, if the experimental task allows for the use of interactive expertise, familiar partners show a better collaborative performance than unfamiliar dyads in collaborative tasks. Moreover, theoretical work suggests that the performance benefit obtained from collaborating with a familiar partner may be more pronounced in older than in younger adults. Applying this line of argument to the specific research design of the present study, I hypothesized the following:

Hypothesis 1.1: Both younger and older adults will need fewer words to cue their spouses than to cue an unfamiliar partner.

Hypothesis 1.2: The beneficial effect of partners' familiarity on collaborative performance will be stronger for pairs of older adults than for pairs of younger adults.

1.12.3 Hypothesized Effects of Using Dyadic Common Ground on Collaborative Performance

The second research question focused on a specific facet of interactive expertise, namely, the use of dyadic common ground among familiar interaction partners. As outlined in section 1.9, the literature on interpersonal cueing suggests that shared knowledge facilitates communication, and that the dyadic common ground among familiar partners may have a similar effect.

In section 1.9, I furthermore consulted the literature on age trajectories in memory functioning and perspective-taking skills and argued that using dyadic common ground with a familiar partner should particularly support older adults' cognitive functioning when

collaborating. Based on this line of argument, I hypothesized the following for the specific research design of the present study:

Hypothesis 2.1: The more dyadic common ground is used among spouses, the fewer words will be needed to successfully cue the spouse, both in younger and in older adults.

Hypothesis 2.2: Using dyadic common ground will reduce the number of required words to successfully cue the spouse to a greater extent in older than in younger couples.

To test these predictions, younger and older adults' collaborative performance was measured in the newly developed experimental task. Part 2 will describe the empirical approach in detail.

2. METHOD

The empirical investigation was conducted within the context of the project *Developmental Regulation of Affect, Motivation, and Abilities* (DRAMA; Dr. Michaela Riediger, Prof. Dr. Ulman Lindenberger) at the Center for Lifespan Psychology, Max Planck Institute for Human Development in Berlin, Germany. The project investigates lifespan changes in processes of developmental regulation within and between persons. Its conceptual focus on regulatory processes is largely influenced by propositions of the SOC Theory (P. B. Baltes & Baltes, 1990; Riediger et al., 2006), according to which human development is moderated through the universal processes of selection, optimization, and compensation. The present study was part of the strand of project work that investigates how these processes unfold within interpersonal contexts.

2.1 Sample of the Taboo Study

The sample consisted of $N = 78$ heterosexual, cohabitating couples ($N = 156$ persons) from two age groups: Younger participants ($n = 76$ persons, forming 38 couples; mean age $= 26.64$ years; $SD = 2.77$), and older participants ($n = 80$ persons, forming 40 couples; mean age $= 71.59$ years; $SD = 3.56$).[12] Participants were recruited by drawing on the project's internal database of former study participants ($n = 17$ couples), by an external survey institute ($n = 27$ couples), by newspaper advertisements, postings in universities and in leisure centers ($n = 14$ couples), and via personal communication ($n = 20$ couples). To participate in the study, couples had to be involved in the relationship for at least six months. Each participant was paid 50 Euros for taking part in the three sessions that the study comprised. Table 2.1 provides an overview of the socio-demographic features of the sample, separately for the younger and the older adults. Most of the younger adults were university students or employed full-time, whereas in the older age groups, almost all participants were retired. Participants tended to have relatively high levels of education. Of the younger adults, the great majority had graduated from high school or a higher educational institution, with hardly any differences among male and female participants.

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[12] One additional older couple's data was assessed in the study but had to be excluded from the analyses due to a lack of the couple's cooperation, which did not allow for the usual standardized procedure. Due to the dependent data structure, the data of the two unfamiliar partners of this couple had to be excluded as well. Six more couples completed only one of the two experimental sessions. Data of couples with only one completed session were not used in the analyses presented here.

About half of the older adults had comparably high degrees of education, among them more men than women. The majority of younger adults was unmarried although all couples cohabitated, which reflects a typical style of living in Germany for younger adults (German Federal Statistical Office, 2007). In the older subsample, none of the participants were unmarried, but mostly married. Few participants among the older adults were divorced or widowed. To ensure that the sample was representative of the normal adult population with respect to participants' level of general cognitive performance, each person was tested on three different measures: perceptual and motor speed (Digit–Symbol Substitution Test, paper-and-pencil version; Wechsler, 1955), vocabulary (*MWT-A;* Lehrl, 1977), and word fluency (cf. P. B. Baltes & Lindenberger, 1997). Table A1 in the Appendix provides an overview of participants' scores in these cognitive tests, which were unobtrusive for the subsamples of both younger and older adults.[13] Information on the younger and older couples' relationship duration can be obtained from Table 2.2. The younger couples' relationship duration was rather short, as compared to the older adults. Special efforts were made to include older participants with a shorter relationship. This led to the recruitment of ten persons (five couples, representing 13% of the older subsample) with this rare demographic combination (older couples with a relationship duration of less than 15 years).[14]

As will be explained in the next section, the experimental task was developed based on the commercial board game Taboo©. Therefore, only couples who played the commercial game Taboo© less than four times a year were included in the study sample in order to exclude persons with repeated practice in the task. Each person took part in two experimental sessions. In each session, the experimental task was to explain twelve different target words to one's interaction partner, with the aim to enable the partner to guess the target. In one of the sessions, this task was completed with the spouse.[15] In the other session, two couples were intermixed to form two unfamiliar dyads. In the following, I will describe the task that was carried out in both of these sessions.

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[13] The scores in the cognitive tests were comparable to those reported in the Berlin Aging Study (BASE; P. B. Baltes & Mayer, 1999) and a meta-analyses by Hoyer, Stawski, Wasylyshyn, & Verhaeghen (2004) on Digit–Symbol performance.

[14] It should be noted that the seemingly high standard deviation in the total subsample of older adults is partly due to five older couples with a relationship duration of less than 15 years. Without these five couples, the mean relationship duration of older couples was $M = 46.05$ years ($SD = 8.42$).

[15] For simplicity, these real-life partners will be referred to as "spouses" from now on, although not all couples were married.

Table 2.1
Socio-Demographic Characteristics of the Sample by Age Group (N = 156)

	Younger Adults n = 76 (38 couples)		Older Adults n = 80 (40 couples)	
	Male	Female	Male	Female
Age (in years)				
Range	21.8–32.8	20.3–32.8	67.0–79.2	62.7–78.8
M	27.3	26.0	72.3	70.9
SD	2.8	2.7	3.7	3.3
Educational Level				
Primary school/ Junior High (8th grade) [a]	0 (0%)	0 (0%)	4 (10%)	9 (23%)
Secondary school level 1 (10th grade) [b]	3 (8%)	5 (13%)	11 (28%)	18 (45%)
High school (12th/13th grade) [c]	25 (66%)	23 (61%)	1 (3%)	6 (15%)
Technical College/ University [d]	10 (26%)	10 (26%)	24 (60%)	7 (18%)
Current Occupation[e]				
Employed full-time	10 (26%)	12 (32%)	2 (5%)	0 (0%)
Employed part-time	3 (8%)	6 (16%)	0 (0%)	3 (8%)
Apprentice	2 (5%)	2 (5%)	0 (0%)	0 (0%)
University Student	22 (58%)	23 (61%)	0 (0%)	0 (0%)
Homemaker	0 (0%)	0 (0%)	0 (0%)	3 (8%)
Unemployed	3 (8%)	1 (2%)	0 (0%)	0 (0%)
Retired	0 (0%)	0 (0%)	40 (95%)	40 (100%)
Other	3 (5%)	4 (11%)	0 (0%)	0 (0%)
Marital Status [f]				
Married	4 (11%)	4 (11%)	33 (83%)	34 (85%)
Unmarried	32 (84%)	33 (87%)	0 (0%)	0 (0%)
Widowed	0 (0%)	0 (0%)	3 (8%)	2 (5%)
Divorced	0 (0%)	0 (0%)	2 (5%)	4 (10%)
Unknown	2 (5%)	1 (3%)	2 (5%)	0 (0%)

[a] German: Grundschule.
[b] German: Haupt- oder Realschule/Mittlere Reife.
[c] German: (Fach-) Abitur.
[d] German: Fach-/Hochschulstudium.
[e] Multiple categories possible (percentages do not add up to 100).
[f] Partners sometimes reported differing marital statuses, presumably due to former relationships.

Table 2.2
Couples' Relationship Duration in Years by Age Group (N = 78 couples)

	Younger Couples *n* = 38	Older Couples *n* = 40
Duration of current relationship		
Range	0.68–10.87	7.30–58.52
M	4.53	41.60
SD	2.49	14.35

2.2 Experimental Task

The aim of the present study was to investigate younger and older interacting dyads' performance in collaborative communication, and to shed light on (a) the role of partners' familiarity and (b) the consequences of using dyadic common ground for this performance. To approach these questions, a collaborative-communication paradigm was developed based on the interactive board game Taboo©, which is freely available for purchase. The task in the game is to explain target words to one's partner. In the commercial version of the game, the task is performed under time constraints. For the present study, unrestricted time was given for task completion. This adaptation was necessary to make the task more age-fair because it was assumed that, under time pressure, older adults, in particular, might not be able to unfold the collaborative potential that they display in real-life situations when communicating (cf. Wingfield, 2000). Instead of using a time limit to quantify participants' performance, the task in this study was to be maximally efficient in one's cueing, that is, to use as few words as possible to allow the partner to guess the correct target. The task was considered especially suitable for the present research questions because of a special constraint included in the rules of the game: The explaining partner was given a list of cue words that were not to be used while explaining the target. According to the commercial version of the game, these forbidden words ("taboo" words) represent the most obvious, publicly known features of a target word. Under the constraints of this rule, a potential benefit of dyadic common ground becomes obvious.

Dyadic common ground can facilitate the task because it allows participants to be flexible in their cueing, avoid the forbidden cues, and draw on their personal, idiosyncratic stock of knowledge. At the same time, dyadic-common-ground cues may enable participants to be economic and efficient in their cueing.

The targets that each participant was to explain to his or her interaction partner were displayed on playing cards that only the explaining partner could see. Those cards showed the target word and the forbidden cue words, which the explaining partner was to avoid in his or her cueing. Figure 2.1 displays a sample playing card. The role of the listening partner was to guess the word based on the cues he or she received from the explaining partner. As guesses by the listening partner could provide the explaining partners with feedback on the interpretation of the previous cues, and thus help them to adapt the subsequent cues to this information, the impact of this kind of feedback was minimized by increasing the threshold for taking guesses for all participants. This was done by informing them that limiting the number of explaining cues and limiting the number of wrong guesses would make for equally good scores. Along the same lines, the guessing partner was not allowed to ask questions at all (such as, "Is it edible?").

BREAD

dough
loaf
baker
toast
butter

Figure 2.1
Sample playing card

2.3   Experimental Manipulations

Besides including participants' age group (younger vs. older adults) as a quasi-experimental between-person factor, the study design comprised two experimental within-person variations of conditions: interaction partners' familiarity and the everyday-life reference of the target words. The rationale for choosing these two experimental within-person manipulations as well as their hypothesized consequences for the display of interactive expertise and for the option to use dyadic common ground have been described in part 1 (section 1.11). Below, I will elaborate on how exactly these experimental variations were implemented.

2.3.1   Experimental Variation 1: Interaction Partners' Familiarity

 The first within-person variation concerned the familiarity among interaction partners. This factor was considered in the design for two reasons: (1) to vary the interactive expertise that dyads could draw upon and (2) to vary the opportunity to use dyadic common ground with the partner.

Familiarity was varied by having participants complete the task once with their spouse, and once with an unfamiliar cross-sex partner of the same age. Figure 2.2 illustrates the assignment of each participant to two interactive settings (interacting with his or her spouse, and

interacting with an unfamiliar partner). Special care was taken to ensure that the interacting dyads in the unfamiliar condition did not know each other before the experiment, and this was reconfirmed by an additional self-report questionnaire at the end of the study.
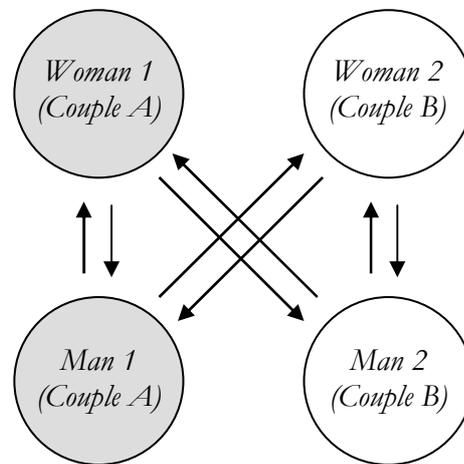
Figure 2.2. Assignment of each participant to two different interaction partners. Each arrow illustrates 12 target words that were explained by a person to the respective interaction partner within one experimental session.

We invited two couples (four persons) at a time, and two equally equipped rooms as well as two experimenters allowed parallel testing of two separate interacting dyads. Both invited couples completed the same experimental condition on that day: Either all four participants worked with their spouses, or all four worked with an unfamiliar partner of the other couple invited for testing on that day. Neither same-sex dyads nor age-heterogeneous dyads were observed in this study. This decision was taken because the experimental manipulation (familiar vs. unfamiliar) should just alter one intended factor (familiarity) while keeping all other circumstances maximally constant. The attempt was made to balance the order of experimental conditions (interacting with the spouse vs. an unfamiliar partner), both within the younger and the older age group. The weekly study schedule, however, was complex as it depended on the time constraints of four people (two couples) who shared an appointment. Under the limitations of these organizational demands, balancing the order of conditions within the age groups was optimized, but not perfectly achieved for the younger couples, as can be seen in Table 2.3. Therefore, I controlled for the order of conditions in all analyses (see section 2.7.6 for more detailed information on control analyses).

Table 2.3
Order of Conditions by Age Group

	Younger participants	Older participants
Spouse first (then unfamiliar)	n = 42 (21 couples)	n = 40 (20 couples)
Unfamiliar first (then spouse)	n = 34 (17 couples)	n = 40 (20 couples)

2.3.2   Experimental Variation 2: Everyday-Life Reference of the Target Words

A second within-person experimental manipulation was implemented to increase the variance in the use of dyadic common ground. To this end, I manipulated the degree to which a target word referred to a couples' typical everyday life. The measure of everyday-life reference of the targets was determined empirically by an independent pre-study, which will be described in the next section. Table 2.4 provides an overview of both experimental manipulations for each participant.

Table 2.4
Overview of the Experimental Manipulations

Age group [a]	Younger participants				Older participants			
Interaction partners' familiarity	Spouse		Unfamiliar partner		Spouse		Unfamiliar partner	
Everyday-life reference of the target words	Low	High	Low	High	Low	High	Low	High

[a] Quasi-experimental variation.

2.4   Stimuli: Selecting the Target Words

The 48 target words used in the main study were carefully selected through an exhaustive procedure. An independent word-rating pre-study with N = 65 adults was run to empirically determine the subjective everyday-life reference of each word (Step A of the selection procedure). In Step B, abstract and rather unfamiliar words were excluded, and for the remaining target words, linguistic databases were searched to consider the word dimensions of frequency in the

media, morphology, and word length. All of these dimensions were considered when creating four equal sets of targets for the study. In the following, steps A and B will be described in detail.

2.4.1 Step A: Word-Rating Pre-Study

Aim of the pre-study. Prior to the main study, an independent pre-study was conducted to allow for an empirically supported selection of the target words for the later Taboo study. The pre-study aimed at determining an estimation of the everyday-life reference of each target word. This information was used in the main study to manipulate the likelihood with which spouses could create idiosyncratic referents for a given target and thus increase the variance in the use of this cueing strategy in the subsample of spouses (see part 1, section 1.11, for more details on the rationale of considering this dimension).

Sample of the pre-study. Initially, 67 participants were recruited for the pre-study. Data from one younger man and from one older woman had to be excluded from data analyses because the task was not completed as instructed.[16] The final sample of the word-rating pre-study ($n = 65$) consisted of younger ($n = 19$), middle-aged ($n = 19$), and older ($n = 27$) individuals living in steady heterosexual partnerships. An overview of the socio-demographic features of the sample is reported in Table A2 in the Appendix. Participants were recruited from the project's database of former participants, and by advertisements in Berlin newspapers, and were paid 34 Euros for participation.

Procedure of the pre-study. Each participant took part in two two-hour computer sessions that were conducted in group sessions with up to six persons. After a detailed oral instruction at the beginning of each session, participants worked independently but were supervised by an experimenter throughout the session. Participants were shown 2688 words taken from the four available commercial versions of the Taboo© game. Some words had been excluded beforehand if they were obviously age-unfair (i.e., differentially likely to be known by adults of different age groups, such as *flat rate*), non-serious (e.g., *love bite*), or proper names of celebrities. The words successively appeared on a computer screen, and participants were asked for each word, "How much is this word a part of your everyday life, or of your partner's everyday life?". Participants marked their ratings by choosing a number on a rating scale ranging from one (not at all) to ten (very much). As an alternative to choosing a number, participants could also indicate that they

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[16] The young man made his judgments with very short reaction times (reaction times were less than 2000 milliseconds for more than 50% of his ratings) and almost never chose a number different from the exact mean of the rating scale. The elderly woman was not able to complete the task.

did not know the target word. Participants rated a varying number of words from the overall pool within the four hours of testing (younger adults: $M = 2610.50$, $SD = 181.32$; middle-aged adults: $M = 2581.41$, $SD = 184.64$; older adults: $M = 2053.34$, $SD = 559.60$). The data were immediately uploaded onto a central server to keep a record of which stimuli a person had already rated, and of how many younger, middle-aged, and older adults had rated a certain target word. Each word was at least rated 19 times by participants of each of the three age groups.

2.4.2   Step B: Word Selection

Excluded trials and excluded target words. 36 single ratings of the word-rating pre-study were excluded because the reaction times, given the task, seemed implausible (< 1500 milliseconds). 26 words were excluded from the selection process because more than one out of 65 participants did not know the target word (such as basilisk, hermit, or wren). 27 names of cities or places were excluded, as well as 126 abstract words (as determined by a consensus rating of three raters).

Optimizing the age fairness of the selection. Based on the empirical pre-study, I selected target words that had obtained maximally extreme ratings in all of the three age groups on everyday-life reference (ratings below the 33rd or above the 67th percentile in all of the three age-specific distributions).

Frequency in the media, word length, and morphology. The last step of the selection procedure aimed at balancing the selected words on several potentially important dimensions. These included the frequency of words in the media (information obtained from the "Wortschatz-Portal," the University of Leipzig's word database, word length (number of letters), and morphology (obtained from the online data base "Wörterbuch der deutschen Morphologie" at Canoonet).

Matching procedure. The finally selected overall set of targets contained 48 words. All selected words had been age-homogeneously rated as extreme on everyday-life reference (24 high, 24 low). These words were distributed into two maximally equal sets of 24 targets each (Main Sets A and B) and then further divided into four subsets à 12 target words (two subsets for each of the two experimental sessions in the later main study). Each subset of targets contained six words with high and six words with low everyday-life reference. Special care was taken to cross-vary the dimensions of everyday-life reference and word frequency for each subset because these two dimensions were correlated ($r = .37$, $p < .05$ in the overall pool of investigated

words).[17] For each subset of cards, the targets were furthermore matched on the dimensions of word length and morphology. As can be seen in Table 2.5, a good matching of all the considered dimensions could be achieved for all four subsets of targets. The dimension of everyday-life reference was well matched for the two main sets, but not as well matched on the level of the four subsets. The procedure in the later main study took this into consideration by assigning the two main sets as well as the four single subsets equally to older and younger interacting dyads, to familiar and unfamiliar dyads, and to men and women (see Table 2.6). The selected single words with their individual features are listed in Table A3 in the Appendix.

Table 2.5
Matching of Word Features Across the Sets of Cards

	Everyday-life reference [a]		Frequency [b]		Length [c]		Morphology	
							Single Nouns	Com- posite Nouns
	M	*SD*	*M*	*SD*	*M*	*SD*		
Main Sets								
Main Set A	.32	.92	14.42	2.19	7.83	2.96	12	12
Main Set B	.34	.82	14.46	2.06	7.67	2.68	12	12
Subsets								
Subset A1	.45	.93	14.42	1.73	8.00	3.49	6	6
Subset A2	.20	.93	14.42	2.64	7.67	2.46	6	6
Subset B1	.15	.84	14.25	1.82	7.67	2.35	4	8
Subset B2	.52	.79	14.67	2.35	7.67	3.09	6	6

[a] Everyday-life reference = means from the z-standardized ratings of all age three age groups (range within the selected words: -1.15–2.21).

[b] Word frequency in the media is indicated in relation to the most frequent word in German ("der", the male nominative). The value of 14 means that the word is 2^{14} times less frequent than the word "der" (range within the selected words: 10 (more frequent)–19 (less frequent).

[c] Word length = number of letters.

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[17] To this end, a median split was performed for the two word dimensions of *word frequency* and *everyday-life reference*, and words were assigned to the lower or upper halves of the respective distributions. Based on this information, four different categories of words were created according to the relative position of the words within each of the two dimensions. Those categories exclusively contained words that were either (1) high on *everyday-life reference* but low on *word frequency*, (2) low on *everyday-life reference* but high on *word frequency*, (3) high on both dimensions, or (4) low on both dimensions. Words from these categories were then distributed equally across the final subsets of cards so that each of the subsets contained an equal number of target words from each category.

2.5 Procedure

The Taboo study included three sessions: One questionnaire session in small groups (duration: 1–2 hours), and two experimental sessions in which the Taboo task was completed (about 2 hours each). An overview of the three sessions is provided in Figure 2.3. The interval between the questionnaire session and the following experimental sessions was usually about one week but was allowed to deviate in individual cases. The interval between the two experimental sessions, however, was at least a day and was limited to a maximum of eight days (time between the two experimental sessions: $M = 1.89$ days, $SD = 1.51$) as a pilot study had suggested practice effects in the task that were assumed to fade with time. Therefore, the attempt was made to hold these assumed effects comparable for all participants.

Table 2.6
Balancing of Main Target Sets and Target Subsets Across the Experimental Manipulations

	Main Set A	Main Set B
Assigned to…(number of dyads)		
Younger *spouses*	38	38
Younger *unfamiliar* dyads	38	38
Older *spouses*	40	40
Older *unfamiliar* dyads	40	40

Explained by…(number of persons)	Subset A1	Subset A2	Subset B1	Subset B2
Younger men (to *spouse*)	11	9	9	9
Younger women (to *spouse*)	9	11	9	9
Younger men (to *unfamiliar* partner)	9	9	10	10
Younger women (to *unfamiliar* partner)	9	9	10	10
Older men (to *spouse*)	11	11	8	10
Older women (to *spouse*)	11	11	10	8
Older men (to *unfamiliar* partner)	9	9	11	11
Older women (to *unfamiliar* partner)	9	9	11	11

Questionnaire Session		Experimental Session I	Interval: $M = 1.89$ days	Experimental Session II
Demographic assessment Cognitive and self-report measures		Warm-up phase and filler task Break Experimental phase Cognitive measure of word fluency	→	Warm-up phase and filler task Break Experimental phase Self-report measures
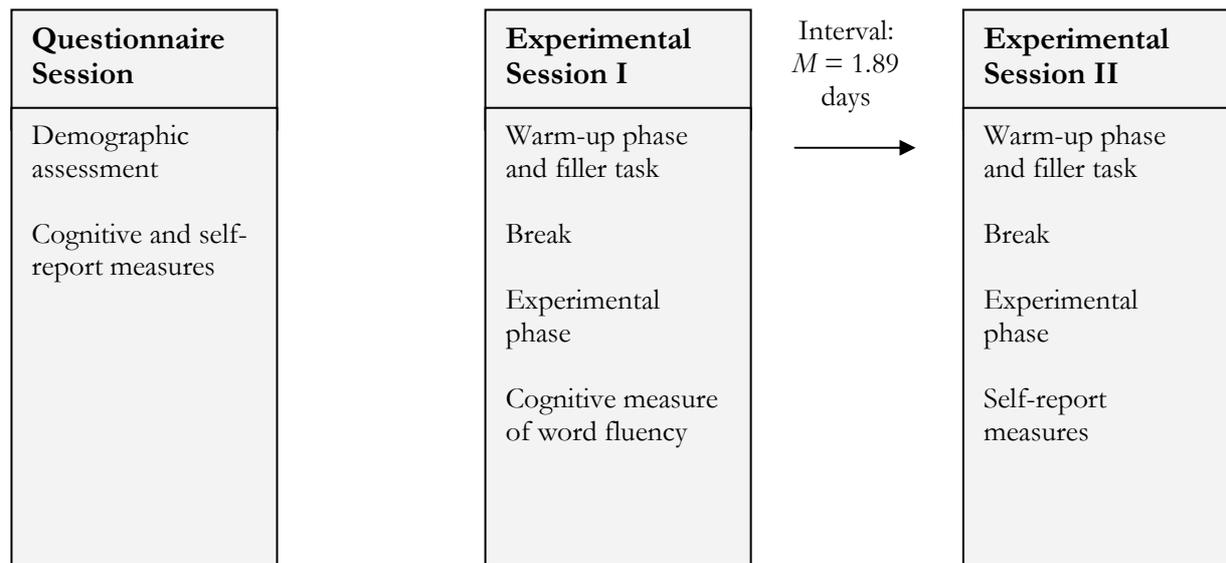
Figure 2.3. Each participant took part in three sessions

In the questionnaire session, demographic information and cognitive measures were assessed. Participants then filled out a comprehensive self-report questionnaire on personality, lifestyle, and relationship measures. The measures relevant for this dissertation will be introduced in section 2.6 (see Table A4 in the Appendix for a complete listing of all the assessed measures).

In one of the two following experimental sessions, participants completed the Taboo task with their real-life partners. In the other experimental session, they interacted with the unfamiliar partner. Each of the two experimental sessions began with an extensive, standardized instruction on the session schedule and on the rules of the Taboo task. Participants then practiced the task with the partner assigned to them for this particular session, completing ten warm-up trials in each dyadic setting (each person explained five practice words and took the guesser's role for the other five words). This rather elaborate warming-up phase took about 15 to 30 minutes per interacting dyad and was included for four reasons: (1) to make sure that participants had understood the task and felt comfortable with it, (2) to provide participants with a sense for frugal communication, (3) to sharpen participants' sensitivity for the rule of avoiding the forbidden words, and (4) to give older participants an ample practice period. The latter was considered important because age differences in practice effects were assumed, in particular for the first trials in a session. The warming-up phase was closely supervised by two experimenters to provide detailed feedback after each trial (target word) was completed. One of the experimenters wrote down the explanations and, after the trial was completed, read out those protocols to the participants while counting the words aloud. The second experimenter provided online feedback

on forbidden words if there were any, indicating this by an immediately displayed acoustic signal (a clicking sound). The trial was continued if a forbidden cue word was used. It was only canceled if the target word itself was revealed by the explaining person. After the trial was over, this second experimenter also provided feedback on (a) the overall number of forbidden words if the explaining partner had used any, and (b) the number of wrong guesses that the listening partner had needed before giving the correct answer. While one of the interacting dyads was practicing the task, the other was led to an adjacent room and carried out a filler task, consisting of single items taken from the IST 2000 (Amthauer, Brocke, Liepmann, & Beauducel, 2001)[18]. Participants were not supervised throughout the filler task but were asked not to speak to each other. They were informed that they would be videotaped by the cameras installed in the room. This was done to ensure that the unfamiliar dyads did not make use of this time to get to know each other.

Items for the filler task were chosen such that their interference with the later experimental task could be assumed to be minimal (i.e., all items aiming at verbal skills were excluded). The only purpose of the filler task was to keep the participants' activities maximally similar while they were waiting for the experimental task. Scores from this task were not included in the dataset.

On completion of the practice phase, participants carried out the main task. In this phase, each interacting dyad (comprised of spouses or unfamiliar persons) was led to different room and was attended by one experimenter. One of the participants explained twelve words while the other partner had to guess the targets. The partners then swapped roles. No feedback on verbal efficiency was given on these main trials. The experimenter just kept indicating any forbidden words with the clicking sound in order to maintain participants' awareness of this rule. Again, participants were allowed to continue with the trial if they used a forbidden cue word. The trial was only cancelled if the target word itself was used in the explanation. All sessions were videotaped to allow for later detailed coding (see below).

At the end of each experimental session, participants filled out a session questionnaire on their enjoyment, compliance, and subjective performance. At the end of the first experimental session (irrespective of the experimental condition completed in this session), a measure of word fluency was obtained from each participant in individual videotaped sessions. At the end of the second experimental session, an additional self-report questionnaire was given that contained questions on the couples' shared history and their shared everyday lives as a couple. These

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[18] For feasibility reasons, practicing with four persons at a time was not possible. To minimize a possible effect of the order of tasks in the pre-experimental phase, a break of 15 minutes was scheduled after each of the four persons had completed both the practice phase and the filler task.

questions were not included in the main questionnaire session at the beginning because they might have primed the concept of dyadic common ground and altered the natural occurrence of the according strategy in the experimental task. Finally, a study questionnaire on participants' experiences and possible problems with the task was given (none of the participants reported any problems with the task). Participants were then paid 50 Euros for participation and debriefed.

2.6   Measures

This section will cover all the measures that are relevant for this dissertation. Below, I will first describe the comprehensive coding procedure that was used to determine the main variables of interest related to participants' performance in the Taboo task. After this, I will introduce the assessed cognitive and self-report measures.

2.6.1   Coding of the Performance in the Experiment

Each videotaped session was first carefully transcribed by six trained transcribers. These verbatim reports were then coded by three trained raters. The coding procedure will be described in detail below. One rater coded 111 (71%) of the interactions, and the other ones 24 (15%) and 21 (14%), respectively. Over the course of weeks, the raters were very intensively trained for this complex task using data from the warming-up trials, which were not used for the analyses. To determine inter-rater reliability of the final codings, 20% of the sessions were again coded by another rater, and each second coding was then compared to the initial coding. The sessions to be coded again were selected such that they included younger and older dyads', as well as familiar and unfamiliar dyads' interactions in equal parts. Each of the other two raters was given 50% of these sessions to be coded again. As recommended by Wirtz and Caspar (2002) for interval-scaled ratings, inter-rater reliabilities were estimated by determining the intra-class correlation (ICC) between two coding scores for a given target dimension on a given trial. The ICC indicates the amount of variance in the measure that can be attributed to differences between the coded trials, and not to differences between the coders (i.e., the proportion of variance of the coded values that is explained by the true values; Wirtz & Caspar, 2002). The ICC values for all coded aspects were high (ICCs based on individual measurements ranging from .92 to .99) indicating very good inter-rater reliability (see Table 2.7 for all ICCs for the coded dimensions). The coded aspects included the number of cues given (explaining partner), number of words needed (explaining partner), number of wrong guesses taken (guessing partner), and number of dyadic-common-ground cues used (explaining partner). As a last step, four independent, trained coders

rated how many forbidden words were used in the explanations, or whether parts of the target itself were used in the explanations. Ten percent of these codings were coded again to determine the inter-rater reliability, which was high (average ICC for forbidden words = .90; for revealed targets = .94). The descriptive statistics for all coded variables can be seen in Table 2.9. The comprehensive coding manual explicated detailed rules for each of the coded aspects. The rationale and main rules for the coding as defined by a 50-page coding manual will be summarized briefly in the following.

Table 2.7
Intra-Class Correlations of Coded Dimensions

Dimension	Average ICC	ICC based on individual measurements
Words	.99	.98
Cues	.96	.92
Dyadic common ground *(absolute value)*	.92	.86
Dyadic common ground *(relative to the number of cues coded)*	.91	.84
Guesses	.99	.98
Forbidden words	.90	.82
Revealed target	.94	.88

Number of cues. Drawing on the idea of distinct *propositions* in oral statements or written text (Meyer, 1975; O'Donnell, Dansereau, Hall, & Rocklin, 1987), the utterances of the explaining partner were divided into separate units of information. For the present study, these units will be referred to as cues. A cue stands for a distinct idea of explaining a target. Examples are, "It stands on a meadow," or "We see it every Sunday." Usually, a cue unit was defined by the new occurrence of a verb, although there were some exceptions.[19]

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[19] Exceptions were (a) auxiliary verbs (e.g., "We *were having* that dish last Sunday") and (b) clauses indicating a person's attitude or affective state, for example, "I *was pleased* when you *made* that dish for me" (counted as one cue only).

Number of words. The cues were further divided into single words. All subjects (expect for "he," "she," "it"), verbs, attributes, objects, adverbs, question words, and conjunctions (except for "and," and "or") were counted separately. Prepositions were taken together as one syntactic unit if they were used in the context of an adverbial phrase (e.g., "under the table," "for the cat"), unless they contained any further specific information ("under the big table," "for my cat"), which was then counted separately.

Number of guesses. All guesses were counted, even if the same guess was repeatedly taken in the course of the interaction. If the guessing person posed a question to the explaining partner (which was not allowed but did occur on some trials), this was counted as a guess if they included a possible solution ("Could it be a dog?").

Dyadic common ground. All videotaped sessions were coded with respect to dyadic common ground, irrespective of the interaction partners' familiarity. The coding of dyadic common ground exclusively considered the explaining partner's *intention* to use shared knowledge. It was ignorant to whether the listening partner showed that he or she could actually relate to this knowledge. The basic units for the coding of dyadic common ground were the mentioned cues (and not the single words) because idiosyncratic information is not necessarily apparent in single words, but becomes obvious in the unique combination of these words. Each explanation could consist of a varying number of cues, each offering the option to refer to dyadic common ground. This implies that a higher number of cues within an explanation increased the probability that dyadic common ground was used in any of the multiple cues. I therefore constructed a relative measure to determine the ratio of common ground to alternative cues within an explanation (i.e., the number of common ground cues, in relation to all cues used within an explanation). In all analyses including dyadic common ground as a predictor for performance, this was the measure used as an indicator of the degree of dyadic-common-ground use in an explanation.

Usually, dyadic-common-ground cues could be very clearly identified by defined markers such as the naming of a not-publicly known name (e.g., "Aunt Anne"), a private place (e.g., a room within a couple's house), or a special private occasion or experience (e.g., "last Christmas Eve"). *Publicly known* persons, places, and occasions were only coded as dyadic-common-ground cues if they were combined with an idiosyncratic, crucial piece of information that made up the core of the cue. An utterance was also coded as dyadic common ground if the rater noticed an unusual (i.e., potentially idiosyncratic) combination of ordinary aspects making the cue seem cryptic to an outside observer. As a single rater's potential lack of knowledge on a specific topic may have biased a coding based on this special rule, all such ratings had to be reconfirmed by the other two raters at a later consensus meeting. Dyadic-common-ground cues were coded

conservatively, meaning that, when in doubt, a cue was rather coded as referring to public, than to idiosyncratic knowledge. As the coding aimed at identifying idiosyncratic, dyadic common ground, all cues pertaining to cultural, subculture-specific, cohort-specific, age-specific, or regional knowledge were coded as public knowledge. Table 2.8 shows sample cues as used by participants of the study.

Table 2.8
Sample Cues Used by Study Participants

Cue	Participant (cueing the spouse)	Wanted Target
"The round present in our shoe box."	male, 28 years old	marble
"We are afraid that Donnie has one."	female, 27 years old	Flea
"Where do you go every week, on Fridays?"	male, 78 years old	hairdresser
"What I sometimes prepare with shrimps."	female, 72 years old	cucumber

Forbidden words and revealed targets. In line with the instructions participants had been given before the task, cue words were considered forbidden if they (a) were used exactly as indicated in the list of forbidden words on the playing cards, or if they (b) contained any of the forbidden words, or if they (c) represented parts or derivations of these words. Participants had also been asked to avoid naming the target word itself or parts of it. According to this rule, the coding also identified trials in which the target itself, or parts of it, had been named. Semantic derivations of targets were not counted as revealed targets, but as forbidden words. If the target word itself was revealed by the explaining person, the trial was cancelled and the data from this trial was excluded from the analyses. Forbidden words were considered in relation to the number of cues needed to explain a target, to determine the degree to which participants violated the rule to avoid these words.

Table 2.9

Descriptive Information on all Coded Variables for Each Age Group [a]

	Total Sample of Trials (Spouse and Unfamiliar)				Trials Completed With the Spouse Only				Trials Completed With Unfamiliar Partner Only			
	Younger Adults		Older Adults		Younger Adults		Older Adults		Younger Adults		Older Adults	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Words	7.32	2.53	13.59	5.12	6.78	2.75	12.42	5.03	7.89	3.55	14.77	7.43
Cues	2.07	0.51	3.21	0.93	1.96	0.65	2.97	0.96	2.19	0.67	3.46	1.34
Dyadic Common Ground [b]	0.16	0.08	0.18	0.09	0.30	0.15	0.32	0.16	0.02	0.04	0.03	0.05
Wrong guesses	0.85	0.40	1.34	0.61	0.81	0.61	1.29	0.78	0.89	0.48	1.42	8.33
Forbidden Words [c]	0.01	0.01	0.03	0.02	0.01	0.02	0.03	0.02	0.02	0.02	0.03	0.03
Revealed Targets [d]	0.66	0.98	1.95	1.53	0.22	0.51	0.86	0.87	0.43	0.77	1.09	1.30

[a] Values refer to the raw distributions before the variable *Words* was transformed. Standard deviations refer to between-person deviations.

[b] Relative to cues used in a trial.

[c] Relative to words used in a trial.

[d] Includes trials in which the target could not be guessed and the dyad gave up on it.

2.6.2 Central Dependent Variable: Number of Words Needed

The chosen measure for performance relied on the *number of words* needed to explain a target, that is, the number of words that the explaining partner required for the listening partner to produce the correct guess. This measure reflects the competencies of both partners in that it depends on the efficiency of the explaining partner's cueing, and also on the listening partner's competencies to process the provided information appropriately and to produce the correct guess based on this information. The contributions of both interaction partners to this measure is reflected by a meaningful variance component due to the listening partner (see section 2.7.2).

Like the number of words needed to explain a target, the *number of guesses* taken by the listening partner can also be conceptualized as a reflection of both partners' performance: It reflects both the quality of the cues provided by the explaining partner, and the listening partner's competence in processing those cues. The *number of guesses* taken by the listening person did not lend itself as an alternative dependent variable due to the low frequency of wrong guesses in the sample (see Table 2.9). This variable was considered as a control variable when predicting the number of words needed to explain a target, as will be reported in the Results part.

2.6.3 Covariates: Cognitive and Self-Report Measures

This section will describe the assessment of three variables that served as covariates in the analyses. Those were participants' Digit–Symbol performance, the size of their social networks outside their partnerships, and couples' relationship duration.

Participants' cognitive-mechanic skills. Age trajectories of cognitive-mechanic resources were accorded special attention when deriving the hypotheses for this dissertation (see part 1). The Digit–Symbol Substitution Test (paper-and-pencil version; Wechsler, 1955) measures perceptual and motor speed and was considered especially meaningful for the present study, as this test is widely used as a marker of aging-related decline in cognitive-mechanic abilities across the adult lifespan (Hoyer et al., 2004). In this task, participants are given an association of digits and symbols. They are then asked to fill in as many symbols matching to a given row of digits as possible in 90 seconds. On average, younger adults typically outperform older adults in this test (Hoyer et al., 2004). This was also the case in the present sample (score for younger adults: $M = 60.17$, $SD = 9.32$; score for older adults: $M = 41.31$, $SD = 8.61$). Both younger and older adults' scores were similar to those found in other studies using this measure (cf. meta-analysis by Hoyer et al., 2004).

Self-report measures used as approximations to couples' interactive practice. The first research question focused on the interpersonal expertise among long-term partners. Interactive expertise has been defined as experience-based knowledge about interactions with a particular partner. Therefore, it is assumed to grow with repeated interactive practice (Dixon, 1999). Two variables were assumed to be related to the amount of interactive practice among cohabitating couples and were therefore included in the analyses: participants' social network outside the partnership and the couples' relationship duration.

Social network outside the partnership. As the first indicator of the amount of cohabitating couples' interactive practice, the participants' social-network size was assessed. This was done because very close romantic partners with few alternative interaction partners may tend to interact more with each other. In contrast, persons with many alternative social partners may not be as specialized in interacting with their romantic partners, but be able to adapt to various alternative interaction partners. We assessed the social network using the circle diagram by Kahn and Antonucci (1980) in which participants are asked to list all meaningful social partners in their everyday lives. Participants then report on several features of these persons (perceived closeness, the kind of relationship, frequency of contact, sex, and age). For the purpose of this dissertation, no special assumptions seemed warranted with respect to these differentiating features. Therefore, the overall number of social partners named in the report was used, irrespective of further information.[20] On average, younger participants reported more social partners (range: 4–48, $M = 19.01$, $SD = 8.03$) as compared to the older participants (range: 3–36, $M = 15.34$, $SD = 8.04$; $t = 2.72$ [149], $p < .05$), reflecting typical age differences in this measure (Lang & Carstensen, 1994).

Relationship duration. Couples' relationship duration might serve as an indicator of the time during which two persons have been exercising very frequent interpersonal contact. The longer partners have been engaged in the relationship, the better they should be able to predict and interpret their partners' actions and utterances. Relationship duration was assessed by self-report. As mentioned in section 2.1, the younger couples' relationship duration was rather short (range: 0.68–10.87 years, $M = 4.53$, $S = 2.49$). On average, the older adults had been engaged in their partnerships for a much longer period of time (range: 7.30–58.52 years, $M = 41.60$, $SD = 14.35$). Therefore, balancing the couples' relationship duration across the two age groups was not possible. This implies that the measures of the spouses' mean chronological age and their

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[20] I subtracted the romantic partner if he or she was explicitly mentioned, deceased persons, and also pets to obtain a measure of the alternative social partners present outside the romantic partnership.

relationship duration were confounded in the present sample.[21] As described in section 2.1, an attempt was made to recruit older participants with a shorter relationship (of less than 15 years), and this was successful for ten persons (five couples, representing 13% of the older subsample).

Several more measures were assessed in this study but not used in the analyses for this dissertation. An overview of all variables can be found in Table A4 in the Appendix.

2.7   Statistical Analyses

The data structure of the data set featured a complex nesting structure due to multiple interdependencies among the single observations. First, I will introduce the general statistical approach and highlight differences in comparison to standard multilevel-modeling approaches. Subsequently, I will describe the interdependencies in the present data set and explain how these were modeled using a specific multilevel approach. I will then describe the sequence of models that I tested to optimally model the meaningful variance components. After this, the procedure for testing the hypotheses, the steps taken to prepare the data for the analyses, and the choice of variables for control analyses will be introduced.

2.7.1   General Statistical Approach: Multilevel Modeling

Group-level comparisons on the level of persons (as used for descriptive information on the data in section 2.7.6) were performed in SPSS 15.0 for Windows (SPSS Inc., 2006). For all other analyses on the level of individual trials, I used multilevel modeling (MLM) to meet the demands of the complex data structure (Kenny et al., 2006; Raudenbush & Bryk, 2002; Singer & Willett, 2003). Those analyses were implemented in SAS 9.1 for Windows (SAS Institute Inc., 2002), using the mixed procedure (PROC MIXED). The multilevel approach offers the opportunity to analyze the data on the highest level of resolution (here: each explained target word) but also takes into account the nesting of the observations within higher-order structures and allows modeling of interdependencies among individual observations.

The model notations that I will describe below draw on a proposal by Snijders and Kenny (1999) for family-data modeling. It is important to emphasize that these notations cannot be interpreted in the same way as standard multilevel-model notations. The present data are different because observations were not neatly nested in successive hierarchy levels (e.g., trials,

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[21] The correlation between spouses' mean chronological age and their relationship duration was substantial and significant in the total sample ($r = .88$, $p < .05$), but not significant within the age groups (for the subsample of younger adults: $n = 38$ couples, $r = .28$, $n.s.$; for the subsample of older couples: $n = 40$ couples, $r = .15$, $n.s.$).

sessions, persons, groups). Therefore, the approach taken for the present work decomposed the variance in the dependent variable into a variance on the level of trials, and *one* additional level of higher-order variance (cf. Snijders & Kenny, 1999). The variance on this second level was further divided into three separate variance components. As I will describe in detail below, these components were associated with (a) the person who explained a target, (b) the person who took on the role of the guessing partner, and (c) the real-life partnership of the explaining person. I modeled each of the three components by including three separate *random effects* in the model. These effects are referred to as random effects because they describe person-varying influences (cf. Snijders & Kenny, 1999). In the following, I will describe the sequence of models that investigated the contributions of these three random effects to the overall variance. Based on this sequence of models, I decided on the optimal model to test the hypotheses.

2.7.2 Sequence of Models and Model Notations

A sequence of alternative models was tested to determine the optimal modeling of variance components (Singer & Willett, 2003). This was not to test any hypotheses, but was rather done in order to adequately capture the multiple interdependencies in the data structure. This step prepared the ground for subsequent hypothesis testing (see section 2.7.4). In the following, I will describe the model development for the total data set (including trials completed with the spouse as well as those completed with an unfamiliar person, $n = 3496$), followed by the according model notation for the total data set. In section 2.7.3, I will describe the development of a second model that was used to analyze the spousal trials only ($n = 1763$), while ignoring unfamiliar dyads' data, and describe the according notation for this model.

Level 1: The trial level. I started with a model that included a fixed part, namely, the overall mean in the dependent measure, and a random part representing the variance from this mean. This random part comprised a residual term and an (initially) unspecified variance (i.e., this first model did not further specify the source of variance in the dependent measure). This can be formulated by the following equation:

$$Y_{ijpk} = \beta_0 + \beta_{1ijp} + \varepsilon_{ijpk;} \qquad\qquad (1)$$

with $\varepsilon \sim N(0, \Sigma)$.

In Equation 1, Y_{ijpk} denotes the number of words needed by a given person i (who belongs to a real-life partnership p to explain the target word to listening person j on a given trial k. This was predicted by an overall mean (β_0), a trial-wise variation from this mean (β_1), and a residual (ε). This residual was assumed to be normally distributed with a mean of 0 and a variance Σ, which is a diagonal matrix with variances differing across trials. No covariance between trials was allowed to make the model more parsimonious.[22]

Level 2: Higher-order interdependencies. Besides the interdependencies between trials, I accounted for three further interdependencies in the data. Starting from the model described by Equation 1, additional variance components were successively included into the model. These components replaced the term β_1 in Equation 1, thereby specifying the source of this variance. After adding any (theoretically warranted) variance component, I tested whether this significantly improved the model fit, as compared to the previous model without this new component (Raudenbush & Bryk, 2002; Singer & Willett, 2003). The final model had the best fit, while including all theoretically meaningful variance components. First, I will describe the individual variance components that were finally included in the model. Then, I will provide the respective notation of this extended model. Table 2.10 shows the successive improvement of the model as additional variance components were considered.

Random effect for the explaining person. As described in section 2.2, each person completed two sessions (with their real-life partners, and with an unfamiliar person). It can be assumed that a participant's general skills (e.g., verbal and intellectual competencies) influenced verbal performance in both sessions. Therefore, measurements from the two sessions were conceived as being nested within the explaining person. A person's skillfulness as the "explainer" could be estimated by drawing on all trials in which he or she took on that role (12 trials with the spouse and 12 trials with an unfamiliar person). Following a procedure described by Goldstein et al. (1998) for a comparable approach in MLwiN, $n(n-1)$ dummy variables were created (with $n = 156$, i.e., the number of participants in the sample) that took on the value 1 if person i was the explaining person in a given trial (and 0 otherwise). The respective random effect for the explaining person took on the role of a random slope at level two that multiplied the

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[22] Allowing for an autoregressive covariance between adjacent trials led to a minor change in model fit for the total sample of spouses ($\Delta\chi^2 = 7.2$ [1], $p < .05$), but not to a significant improvement for the subsample of spouses ($\Delta\chi^2 = 0.3$ [1], *n.s.*). To allow for a better comparison of the models that were used for the two main sets of analyses (i.e., those using the total sample and the subsample of spousal trials only), only variances were considered in the estimation procedure for both sets of analyses.

Table 2.10

Model Development and Chosen Model for the Prediction of Words Needed to Explain the Target: Total Data Set (N = 3496 Trials) [a]

Model	Variance components included in the model [b]					Model Fit (- 2 Log Likelihood)	$\Delta\chi^2$ (df = 1)	Compared to Model
	Trial	*Explaining Partner*	*Guessing Partner*	*Explaining Partner's Partnership*	*Guessing Partner's Partnership*			
1	.118	–	–	–	–	2443.8	–	–
2	.086	.032	–	–	–	1705.0	738.8*	1
3	.086	.007	–	.025	–	1652.2	52.8*	2
4	.083	.023	.008	–	–	1651.7	53.3*	2
5	**.083**	**.006**	**.005**	**.022**	**–**	**1610.7**	**41.0***	**4**
6	.083	.006	.004	.021	.002	1609.0	1.7 *n.s.*	5

Note. The *Trial* component corresponds to ε in Equation 1. The variance component of the *Explaining Partner* corresponds to U_{1i}, that of the *Guessing Partner* to U_{1j}, and that of the *Explaining Partner's Partnership* to U_{1p} (all in Equation 2). The final model is printed in boldface.

[b] The proportion of variance in the dependent variable accounted for by the respective component is indicated.

* $p < .05$. *n.s.* not significant.

dummy variables. As expected, including a random effect for the explaining person significantly improved the model fit ($\Delta\chi^2 = 738.8$ [1], $p < .05$).

Random effect for the guessing person. A person's performance when explaining a word may not only depend on the explaining partner's skills, but also on how well the listener interprets the information provided and processes it appropriately. In the literature on dyadic data analyses, this is referred to as a partner effect (for an overview, see Kenny et al., 2006). Here, the guessing person's skills were modeled by taking into account the performance in all trials in which this person had the guessing role (12 trials with the spouse, and 12 with the unfamiliar person, respectively).

Again, $n(n$-1) dummy variables were created (with $n = 156$, i.e., the number of participants in the sample). These dummy variables took on the value 1 if person j was the guessing person in a given trial (and 0 otherwise) and were multiplied by the random effect for the listening person. Adding this effect for the listening person's contribution to the variance resulted in a further, significant improvement in model fit ($\Delta\chi^2 = 53.3$ [1], $p < .05$).

Natural couples' interdependencies. Persons in stable relationships tend to be more similar to each other than unfamiliar persons on many dimensions such as socio-demographic factors, cognitive variables, and personality traits (Epstein & Guttman, 1984; Kenny et al., 2006). This similarity has been described as a function of either assortative mating, or as something that develops over the course of a relationship through partner effects, mutual influence, or common fate (Kenny, 1996; Kenny & Judd, 1986). Close-relationship partners' individual scores in the current study should therefore be influenced by a higher-order factor of their belonging to the same real-life partnership. This influence was estimated by considering all trials in which any of the two members of a natural couple took on the role of the explaining person (12 trials for each of the two persons when interacting with each other, and 2 x 12 trials in which the two partners explained words to their respective unfamiliar interaction partners). The respective $n(n$-1) dummy variables created for the estimation of the respective random effect ran from 1–n (with $n = 78$, i.e., the number of natural couples in the sample). These took on the value 1 if the explaining person in a given trial belonged to real-life partnership p (and 0 otherwise). The random effect for the explaining person's partnership multiplied these dummy variables. When including this random effect to the model, this led to a significant improvement in model fit ($\Delta\chi^2 = 41.0$ [1], $p < .05$).

The division of the variance into the three described variance components at level 2 is expressed in Equation 2:

Level 2:

$$\beta_{1ijp} = U_{1i} + U_{1j} + U_{1p};$$ (2)

with $U_{1i} \sim N\ (0, \sigma_{1i}^2)$; $U_{1j} \sim N\ (0, \sigma_{1j}^2)$; $U_{1p} \sim N\ (0, \sigma_{1p}^2)$.

The variance components modeled on level 2 were the variance due to the explaining person (U_{1i}), that due to the listening person (U_{1j}), and that due to the explaining person's partnership (U_{1p}). The variances of these three random components modeled at level 2 were assumed to be normally distributed with a mean of 0 and a variance σ^2. The estimates for the amount of variance that was accounted for by any of the three components can be seen in Table 2.10. The largest part of the variance was accounted for by the trials. A smaller but meaningful proportion of the variance was due to differences between real-life partnerships. Two additional contributions to the variance were modeled by the random effects for the explaining and for the guessing person.

A note on two variance components not included in the model. Two further variance components may be considered theoretically meaningful. First, I described the inclusion of a random effect for the explaining person's real-life partnership above. It would also have been possible to include a respective random effect for the listening person's partnership. However, this did not further improve the model fit ($\Delta\chi^2 = 1.7$ [1], *n.s.*). This component was therefore omitted from the model to keep it parsimonious.

Second, an additional proportion of variance in the dependent variable might have been associated with the interpersonal constellation of an interacting dyad. Over the course of an experiment, a connection can develop among interaction partners, no matter whether they were familiar to each other prior to the experiment or not (*experimental linkage*, cf. Kenny et al., 2006). Estimating this additional variance component was not possible with the present data set as every participant just interacted with two different persons, thus offering too few observations for the estimation of such an effect.

2.7.3 Specific Analyses in the Subsample of Spouses

The second hypothesis aimed at the role of dyadic common ground for couples' performance. As the strategy of dyadic common ground was hardly ever used among unfamiliar couples, analyses dealing with this hypothesis exclusively used the valid trials completed with the spouse ($n = 1763$). To find the model that best fitted this subsample of the data, I again started with a model containing only the overall mean (β_0) as the fixed part, and a random part (the variation from this mean), which consisted of a residual term and an additional (and initially unspecified) variance component (β_1). The model was then extended according to the procedure described in section 2.7.2. This was again done by splitting the to-be-explained variation from the overall mean (referred to as β_1 at level 1 of the model) into separate sources of variance at level 2. Adding a random effect for the explaining person improved the model fit significantly ($\Delta\chi^2 = 384.5$ [1], $p < .05$). Next, a random effect for the explaining partner's partnership was included in the model, which further improved the model fit ($\Delta\chi^2 = 48.8$ [1], $p < .05$). In this subset of the data, the variance accounted for by the listening person was already fully represented by this random effect, as each person was assigned to only one person (the spouse). Accordingly, a random component for the guessing partner was not included in this model. Table 2.11 shows the sequence of the models that were tested in order to find the best-fitting model of the data subset including the trials completed among spouses only. This table also provides the estimates for the amount of variance that was accounted for by the two described components.

The final baseline model for all analyses using the spousal trials only is expressed by the following equations 3 and 4. Equation 3 describes the notation of the model at level 1.

Level 1:

$$Y_{ipk} = \beta_0 + \beta_{1ip} + \varepsilon_{ipk;} \tag{3}$$

with $\varepsilon \sim N(0, \Sigma)$.

Again (cf. Equation 1), Y_{ipk} denotes the number of words needed by a given person i (with a real-life partnership p) to complete the task on a given trial k. Similar to the level-1 equation for the total sample of trials (cf. Equation 1), this was predicted by an overall mean (β_0), a trial-wise variation from this mean (β_1), and a residual (ε). This error was assumed to be normally distributed with a mean of 0 and a variance Σ, which is a diagonal matrix with variances

differing across trials. No covariance between trials was allowed to make the model more parsimonious (cf. Footnote 21, p. 63). As described above, the model divided the variance on level 2 into two further variance components, as expressed in Equation 4:

Level 2:

$$\beta_{1ip} = U_{1i} + U_{1p;} \qquad\qquad\qquad (4)$$

with $U_{1i} \sim N\ (0, \sigma^2_{1i})$; $U_{1p} \sim N\ (0, \sigma^2_{1p})$.

These components represent the variance due to the explaining partner (U_{1i}), and that due to the explaining partner's partnership (U_{1p}). The variances of these two random components modeled at level 2 were assumed to be normally distributed with a mean of 0 and a variance σ^2. Table 2.11 provides the estimates for the amount of variance that was accounted for by the two meaningful variance components.

Table 2.11

Model Development and Chosen Model for the Prediction of Words Needed to Explain the Target: Subsample of Trials Completed with the Spouse (n = 1763) [a]

Model	Variance components included in the model [b]			Model Fit (- 2 Log Likelihood)	$\Delta\chi^2$ (df = 1)	Compared to Model
	Trial	*Explaining Partner*	*Couple*			
1	.109	–	–	1095.3	–	–
2	.074	.035	–	710.8	384.5*	1
3	**.074**	**.006**	**.028**	**662.0**	**48.8***	**2**

Note. The *Trial* component corresponds to ϵ in Equation 3. The variance component of the *Explaining Partner* corresponds to U_{1i} and that of the *Guessing Partner* to U_{1j} (both in Equation 4).

[a] The final model is printed in boldface.

[b] The proportion of variance in the dependent variable accounted for by the respective component is indicated.

* $p < .05$.

2.7.4 Inclusion of Fixed Effects and Testing of Hypotheses

In the last sections, I described how the variance in the dependent measure (the number of words needed to explain a target) was modeled. Identifying meaningful sources of variance and including the respective random effects in the model was done in order to capture multiple

interdependencies among the observations. This procedure did not yet aim at testing any hypotheses. Rather, this prepared the ground for the second step of hypothesis testing, for which I built on the models reported above, and again used SAS PROC MIXED (SAS 9.1 for Windows; SAS Institute Inc., 2002).

The multilevel approach recommended by Snijders and Kenny (1999) offers the option to straightforwardly include predictors for testing hypotheses about covariates. Following recommendations by Snijders and Kenny (1999), the predictor variables of interest for the purpose of the present dissertation were added to the model as fixed effects, thereby extending the fixed part of the model (which, in Equation 1, was only represented by the overall mean β_0). The random part was not changed by adding predictors. The inclusion of such a fixed effect will be illustrated here for the variable of participants' age group, added as a predictor (for the number of words needed as outcome measure) in the total sample of trials. This variable was a dummy variable that took on the value 0 if the interaction partners in a given trial were younger adults, and 1 in trials completed among older adults. This variable took on equal values for all trials completed by a given participant in a given session. Therefore, the equation for the model at level 1 was identical to Equation 1. The equation at level 2 was supplemented by a fixed effect for participants' age group, represented by the symbol A:

Level-2 equation when including a fixed effect for participants' age group:

$$\beta_{1ijp} = U_{1i} + U_{1j} + U_{1p} + \gamma \cdot A_{1i;} \tag{5}$$

with $U_{1i} \sim N\ (0, \sigma_{1i}{}^2)$; $U_{1j} \sim N\ (0, \sigma^2{}_{1j})$; $U_{1p} \sim N\ (0, \sigma^2{}_{1p})$.

As in Equation 2, the variance components modeled on level 2 were the variance due to the explaining person (U_{1i}), that due to the listening person (U_{1j}), and that due to the explaining person's partnership (U_{1p}). Furthermore, the influence of the predictor A was represented by a weighted, person-varying factor (A_{1i}).

The effect of a predictor was interpreted as significant if the probability level (p) of the estimate was below .05 (Singer & Willett, 2003). In models using full maximum likelihood estimation (FML), changes in model fit are regarded as additional prerequisites for judging the significance of the fixed effects because under FML, the fit statistics describe the fit of the entire model including the fixed effects. The models that I used for hypothesis testing in the present study were obtained using restricted maximum likelihood (REML) estimation. Under REML,

goodness-of-fit statistics describe the fit of the stochastic portion of the variance only (i.e., the random effects, Singer & Willett, 2003). Therefore, a change in model fit does not provide information about the meaningfulness of the fixed effects in this case.

The most frequent recommendation for the estimation of effect sizes in MLM is to report Pseudo-R^2 statistics that indicate the amount of variance explained on each level of the nested data (Kreft & de Leeuw, 1998; Singer & Willett, 2003). A non-trivial disadvantage of Pseudo-R^2 statistics is that they are not as easy to interpret as the R^2 statistics used in standard regression analyses, as the amount of explained variance needs to be considered separately for each variance component. This renders the interpretation especially challenging when dealing with very complex nesting structures like those in the present study. Due to this constraint, accordingly obtained estimates of effect sizes were not considered reliable for the present analyses. As an alternative means for judging the size of the effects, the results will be illustrated graphically along with the results of the statistical tests. If not indicated otherwise, they will rely on parameter estimates from MLM. As the dependent measure was transformed prior to the analyses (see next section), I used values that I retransformed into the more intuitive measure of actual words needed (instead of using the estimated values for the log-transformed distribution which was used for the analyses). For these graphical illustrations, I applied the parameter estimates of the analyses to the log-transformed dependent variable, and then re-transformed the values of the dependent variable into the according value in the distribution of real words.

2.7.5   Data Cleaning and Preparation

Treatment of missing values. Missing data on the *level of individual trials* occurred exclusively in single trials (i.e., target words) that were not completed as usual. This happened either if the explaining person revealed the target word to their respective partner while explaining it, or if the interacting dyad gave up on a target word after trying for a long time. In fact, 7% of all trials did not represent valid observations. Analyses thus exclusively relied on normally completed trials (n = 3496 valid trials in the overall data set; n = 1763 valid trials in the spouse condition).

Missing data on the *level of persons* were rare. Five persons' (3%) self-reports on their social network were considered missing because these persons had named groups of persons instead of single social partners. Due to the relatively low frequency of missing values on the level of trials or persons, those observations were excluded from the analyses. In eleven couples (14%), the partners' reports of their relationship duration were not the same (difference between partners for these eleven cases: M = 1.66 years, SD = 1.51). For these participants, the mean of both

partners' values was considered the best estimation of the true value and was assigned to both partners. One person (0.5%) did not provide any information on her relationship duration. This person was assigned the relationship duration declared by her partner.

Model assumptions and variable transformations. All variables included in the analyses were visually inspected for deviances from normality, and the residual plots of the regressions were checked for linearity. The dependent variable in all the analyses (the number of words needed to explain a target) displayed a substantial positive skewness. I followed recommendations by Tabachnick and Fidell (2001) who suggested using the base 10 logarithm, that is, $\log_{10}(x)$, of the values for variables with distributions of substantial positive skewness. After this transformation, the assumptions of normality and linearity were met. All analyses were therefore performed using the log-transformed variable distribution. Among the predictor variables, some displayed moderate skewness or kurtosis. As regression models are considered robust to deviances from normality in the predictor variables (e.g., Gelman & Hill, 2007), I refrained from transformations for those predictors. An overview of the variable distributions can be found in Table A5 in the Appendix.

I considered allowing inequality of variances in the dependent variable among younger and older adults. This was done by comparing the model fit of the regular null-model (including the intercept and a random component for the varying trials in a session) to a model that assumed inequality of variances on the level of trials. Assuming unequal variances between younger and older adults did not lead to a significant improvement in model fit ($\Delta\chi^2 = 0.9$ [1], *n.s.*). Therefore, variances in the dependent variable were constrained to be comparable for younger and older adults.

Given the repeated-measures design in the present study, I adjusted the degrees of freedom in all models according to the Kenward-Roger (KR) correction procedure (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006; Kenward & Roger, 1997).

Centering of predictor variables. Following the recommendations for multiple regression analyses (e.g., Aiken & West, 1991; Singer & Willett, 2003), all continuous predictors were centered prior to the analyses (i.e., the group mean was subtracted from the individual values). For all analyses performed on a split-data file, the subsample mean was subtracted from the individual scores. Measures that varied from trial to trial (such as the use of dyadic common ground or the use of forbidden words) were not simply centered at the grand mean of all values. To weigh the influence of each person equally, irrespective of the number of valid trials that he or she provided, the mean of all personal means was subtracted from the single values. For this, I

first calculated each person's mean. I then took the total mean of these personal mean scores as a reference for centering the individual values (see Nezlek, 2001).

2.7.6 Control Analyses

Several variables were controlled for in the analyses by including these variables in the model as additional predictors. They were the *order of experimental conditions* and the degree to which the explanation contained *forbidden cue words*. In the following, I will describe the rationale that suggested controlling for these variables. I will also report on the additional empirical support for this decision as provided by the present data.

Order of experimental conditions. As outlined in section 2.3.1, balancing the order of conditions within each age group was attempted because I expected performances to be enhanced in the second session, when people had more experience with the task. This balancing was accomplished for the subsample of older adults. For the younger age group, a balanced design was nearly, but not perfectly achieved: slightly more participants completed the session with their spouses first. Analyses revealed that people did actually perform better in the second session after controlling for the experimental condition (i.e., after controlling for partners' familiarity; $\beta_{\text{second session}} = -.04$, $t = -4.15$ [3268], $p < .05$).[23] In addition, younger adults profited more from the benefits of practice in the second session than did the older adults ($\beta_{\text{Age Group x Effect of Second Session}} = -.05$, $t = 2.76$ [2073], $p < .05$).[24] Therefore, the order of conditions was controlled for in all analyses.

Use of forbidden cue words. Occasionally, participants used the forbidden cue words indicated on the playing card despite being instructed to avoid them. Using these target-related cues may facilitate the explanation and thus allow people to require fewer words to cue their partners (the forbidden words were semantically related to the targets). This consideration was supported by statistical analyses: The more forbidden cue words were used in a trial (in relation to all words used in a trial), the better performance was ($\beta_{\text{forbidden words}} = -.38$, $t = -5.25$ [3365], $p < .05$).[25] In

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[23] Predicting the number of words needed (log-transformed distribution). Additional predictor: *partners' familiarity* ($\beta = -.06$, $t = -5.94$ [2058], $p < .05$).

[24] Predicting the number of words needed (log-transformed distribution). Additional predictors: *partners' familiarity* ($\beta = -.06$, $t = -6.11$ [3273], $p < .05$), *age group* ($\beta = .23$, $t = 8.20$ [119], $p < .05$), *effect of second session* ($\beta = -.08$, $t = -4.84$ [1518], $p < .05$). As follow-up analyses revealed, younger adults generally performed better in the second session, even when controlling for the experimental condition at hand, that is, when controlling for partners' familiarity (*effect of second session:* $\beta = -.07$, $t = -4.82$ [635], $p < .05$; additional predictor: *partners' familiarity* ($\beta = -.06$, $t = -4.06$ [1650], $p < .05$). This effect was not significant for the older adults (*effect of second session:* $\beta = -.02$, $t = -1.00$ [1466], *n.s.*; additional predictor: *partners' familiarity* ($\beta = -.06$, $t = -4.57$ [1620], $p < .05$).

[25] Predicting the number of words needed (log-transformed distribution) in multilevel modeling.

older adults, the mean use of forbidden words relative to all words used was higher than in younger adults (younger adults: $M = .01$, older adults: $M = .03$; $t = -6.6$ [154], $p < .05$).[26] Besides this, there was an age-differential influence of these forbidden words on performance: Only older adults' performance was reliably enhanced by using forbidden words ($\beta_{\text{Age Group x Forbidden Words}}$ $= -.48$, $t = -3.08$ [3369], $p < .05$).[27] Setting all trials with forbidden words to missing was not an option because a large part of the data would have been lost in this way. Therefore, the facilitation that was gained from these breaches of the rule was taken into consideration by controlling for the relative number of forbidden words (in relation to all words used in a trial) in all analyses.

Additional control variables. The control variables mentioned above were applied by default to all analyses because empirical arguments provided by the present data set strongly suggested this. Ignoring them could have led to a fundamental bias of the results, which could have partly been a function of age-differential effects of the order of experimental conditions, or of breaches of the rules. Whenever additional control analyses were undertaken, this will be reported along with the results.

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[26] Results obtained from analysis of variance (ANOVA).

[27] Predicting the number of words needed (log-transformed distribution) in multilevel modeling. Additional predictors: *age group* ($\beta = .28$, $t = 10.54$ [91.3], $p < .05$), *effect of using forbidden words* ($\beta = -.08$, $t = -.62$ [3363], $p < .05$). Follow-up analyses showed that, for the older adults, a higher degree of forbidden words in a given explanation significantly reduced the number of words needed (*forbidden words:* $\beta = -.55$, $t = -6.21$ [1673], $p < .05$). This effect was not significant for younger adults (*forbidden words:* $\beta = -.08$, $t = -.68$ [1704], *n.s.*).

3. RESULTS

This part is divided into two major sections. In section 3.1, I will address analyses related to the first research question: Do older adults profit more from interactive expertise than younger adults do? In section 3.2, I will describe the analyses pertaining to the second research question: Do older adults profit more from using dyadic common ground than younger adults do?

For each section, follow-up analyses will be reported that further investigated how partners' familiarity and the use of dyadic common ground were associated with performance, and how this can help to understand the age-differential result patterns. Table 3.1 revisits the research questions and hypotheses for this dissertation as they were introduced in part 1 and refers the reader to the chapter in which I will report the respective results.

Table 3.1
Overview of Research Questions and Hypotheses

Research Question 1	**Do older adults profit more from interactive expertise than younger adults do?**	**Section 3.1**
Hypothesis 1.1	Both younger and older adults will need fewer words to cue their spouses than to cue an unfamiliar partner.	Section 3.1.1
Hypothesis 1.2	The beneficial effect of partners' familiarity on collaborative performance will be stronger for pairs of older adults than for pairs of younger adults.	Section 3.1.1
Research Question 2	**Do older adults profit more from using dyadic common ground than younger adults do?**	**Section 3.2**
Hypothesis 2.1	The more dyadic common ground is used among spouses, the fewer words will be needed to successfully cue the spouse, both in younger and in older adults.	Section 3.2.2
Hypothesis 2.2	Using dyadic common ground will reduce the number of required words to successfully cue the spouse to a greater extent in older than in younger couples.	Section 3.2.2

3.1   Effect of Partners' Familiarity on Performance

In the following sections, I will address the first research question. Here, I will report on the analysis that tested the hypothesized age-differential effect of partners' familiarity on their performance in the experimental task (section 3.1.1). After this, I will introduce follow-up analyses that highlight the role of participants' cognitive-mechanic skills as a moderator of the effect of familiarity (section 3.1.2). Finally, I will report on follow-up analyses that point to possible moderating factors of interactive expertise that are related to participants' life conduct (section 3.1.3).

3.1.1   Was There an Age-Differential Familiarity Effect?

In Hypothesis 1.1, I predicted that spouses would need fewer words to cue their partners than to cue an unfamiliar partner. Furthermore, in Hypothesis 1.2, I assumed that this effect would be greater for older than for younger adults. In the following, I will describe the results of the model that tested Hypotheses 1.1 and 1.2 statistically. I performed MLM, using all valid trials completed with the spouse and with an unfamiliar partner ($N = 3496$). The model built on the baseline models introduced in part 2 (Equations 1 and 2). It included participants' *age group, partners' familiarity* (i.e., the experimental condition), and the interaction effect of *age group* and *partners' familiarity* as fixed effects.

Figure 3.1 shows the estimated means for younger and older couples, and for younger and older unfamiliar dyads. Table 3.2 provides an overview of the results including the estimates for the additional predictors included in the analysis. The main effect for *partners' familiarity* was significant, providing support for Hypothesis 1.1: Both younger and older spouses needed fewer words to cue each other, as compared to contemporary unfamiliar dyads. As was expected for the cognitively demanding experimental task, the main effect for participants' *age group* was significant: Across both experimental conditions, younger adults required fewer words than older adults to cue their partners. Contrary to Hypothesis 1.2, the interaction effect of *age group* and *partners' familiarity* was not significant. This indicates that participants generally needed fewer words to cue their spouse than to cue the unfamiliar partner. However, younger and older adults did not profit differentially, but to a comparable degree from the partners' familiarity.
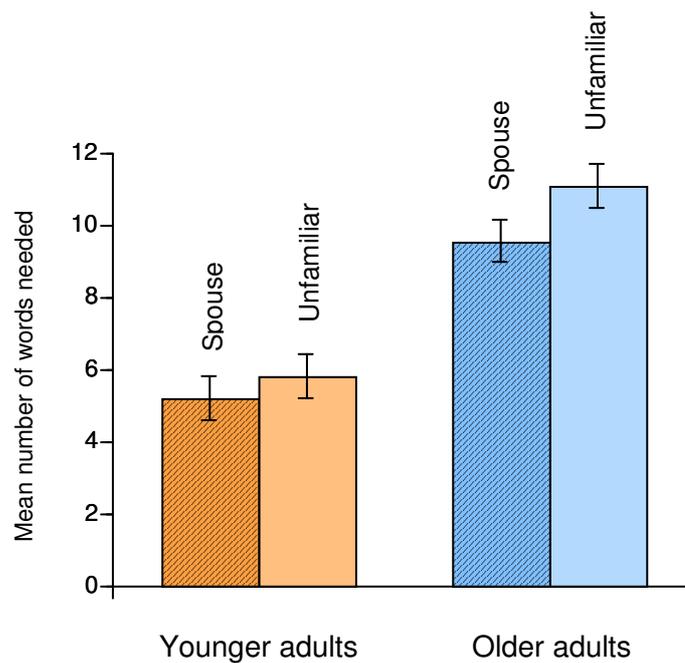
Figure 3.1. Participants' performance by age group and experimental condition (session with the spouse vs. session with unfamiliar partner). Bars show the estimated subsample means as obtained from MLM using the log-transformed distribution of the dependent variable. Error bars indicate 95% confidence intervals. Estimated means and confidence intervals were re-transformed and are shown in the real metric of the dependent variable. There was no significant interaction of participants' age group with partners' familiarity when predicting performance.

Table 3.2

Interaction Effect of Partners' Familiarity and Participants' Age Group When Predicting Performance in the Total Sample of Trials (N = 3496)[1]

Fixed effects	Parameter Estimates		
	β	t	*df*
Interaction effect of partners' familiarity and participants' age group	-.02	-0.80	3264
Main effect of partners' familiarity	-.05 *	-3.63	3258
Main effect of participants' age group	.26 *	9.33	112
Order of conditions	.02	0.62	76.6
Use of forbidden words	-.41 *	-5.65	3374

[1] The number of words needed (log-transformed distribution) is predicted. * $p < .05$.

3.1.2 Follow-Up Analyses: The Role of Cognitive-Mechanic Skills

It was reported in the last section that Hypothesis 1.1 was supported by the data, but that no evidence was found in support of Hypothesis 1.2. Older adults' performance did not profit more than that of younger adults from partners' familiarity. Rather, performance in both age groups profited from the partners' familiarity to a comparable degree. As elaborated in part 1, one major reason for assuming an interaction effect of *age group* and *partners' familiarity* when predicting performance was that older adults, as compared to younger adults, usually encounter comparatively greater constraints in their individual mechanic-intellectual abilities. However, the present sample also displayed considerable variability in this measure within the age groups, and some participants reached Digit–Symbol scores that fell within the distributions of both investigated age groups, as can be seen in Figure 3.2.
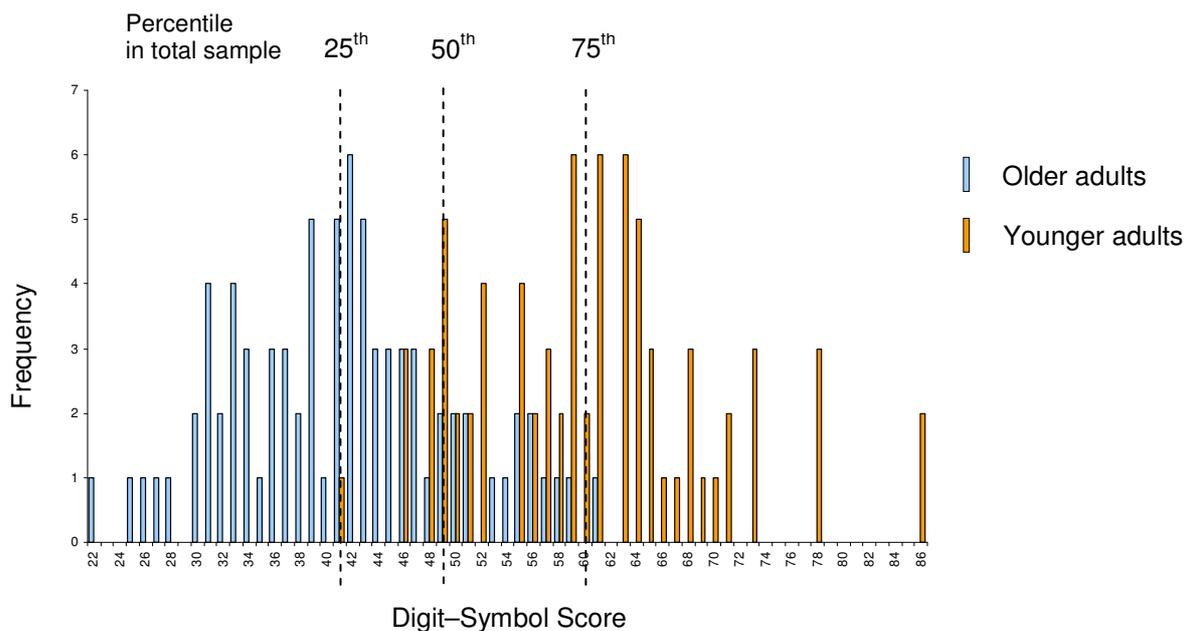
Figure 3.2. Digit–Symbol distribution across the total sample of participants (*N* = 156). Dotted lines indicate the total-sample split into quartiles according to participants' Digit–Symbol scores.

If cognitive-mechanic skills are a crucial moderating factor for the effect of partners' familiarity on collaborative performance, then age in itself, while being correlated with cognitive-mechanic performance, might be a subordinate factor when predicting the effect of partners'

familiarity, and a person's cognitive-mechanic skills (irrespective of his or her age) might be better able to predict the scope of this effect.

I therefore tested whether the explaining partner's *Digit–Symbol score* moderated the performance benefit when working with the spouse (as compared to working with an unfamiliar partner). The interaction effect of the explaining partner's *Digit–Symbol score* and *partners' familiarity,* while controlling for the guessing partner's respective score, was significant (βExplaining Partner's Digit–Symbol Score x Partners' Familiarity $= .002$, $t = -2.01$ [2710], $p < .05$).[28]

A graphical illustration of the interaction effect of the *explaining partner's Digit–Symbol score* and *partners' familiarity* on performance is provided in Figure 3.3. This figure shows the effect of *partners' familiarity* separately for four equal quartiles of the investigated sample, depending on participants' Digit–Symbol score. It illustrates that a higher Digit–Symbol score was associated with a better mean-level performance in the experimental task. In addition, participants in the lower three quartiles of the Digit–Symbol distribution profited from working with their spouse (as opposed to working with an unfamiliar partner). Only the upper quartile of participants with the highest Digit–Symbol scores in the investigated sample did not perform differently in the two experimental conditions.

The analyses were repeated after splitting the sample by age group. Results indicated that in younger adults, the effect of partners' familiarity for performance depended on their Digit–Symbol score (βExplaining Partner's Digit–Symbol Score x Partners' Familiarity $= .004$, $t = -2.57$ [346], $p < .05$),[29] indicating that only younger participants with a relatively low Digit–Symbol score did better when cueing their spouse (vs. cueing an unfamiliar partner). In contrast, *older* participants' performance generally profited from partners' familiarity, irrespective of their Digit–Symbol score (βExplaining Partner's Digit–Symbol Score x Partners' Familiarity $= .001$, $t = -.33$ [594], *n.s.*).[30]

The absence of an effect of *partners' familiarity* for people in the upper quartile of the Digit–Symbol distribution may suggest a functional floor effect for the given experimental task and raises the question if participants with high cognitive-mechanic skills would also profit from

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[28] Predicting the number of words needed (log-transformed distribution). Additional predictors: *explaining partner's Digit–Symbol score* ($\beta = -.004$, $t = -4.17$ [225], $p < .05$), *partners' familiarity* ($\beta = -.06$, $t = -5.98$ [3263], *p < .05*), *order of conditions* ($\beta = .02$, $t = .81$ [72.3], *n.s.*), *use of forbidden words* ($\beta = -.40$, $t = -5.51$ [3366], *p < .05*), *guessing partner's Digit–Symbol score* ($\beta = -.004$, $t = -4.53$ [166], *p < .05*).

[29] Predicting the number of words needed (log-transformed distribution). Additional predictors: *explaining partner's Digit–Symbol score* ($\beta = .001$, $t = .45$ [112], *n.s.*), *partners' familiarity* ($\beta = -.09$, $t = -4.23$ [771], *p < .05*), *order of conditions* ($\beta = .01$, $t = .38$ [34.6], *n.s.*), *use of forbidden words* ($\beta = -.10$, $t = -.78$ [1702], *n.s.*), *guessing partner's Digit–Symbol score* ($\beta = -.002$, $t = -1.60$ [65.1], *n.s.*). *Digit–Symbol score* was centered at the younger participants' mean for this analysis.

[30] Predicting the number of words needed (log-transformed distribution). Additional predictors: *explaining partner's Digit–Symbol score* ($\beta = .002$, $t = -1.03$ [122], *n.s.*), *partners' familiarity* ($\beta = -.06$, $t = 2.69$ [1017], *p < .05*), *order of conditions* ($\beta = .03$, $t = .76$ [43.5], *n.s.*), *use of forbidden words* ($\beta = -.57$, $t = -6.40$ [1668], *p < .05*), *guessing partner's Digit–Symbol score* ($\beta = -.0002$, $t = -.13$ [73.6], *n.s.*). *Digit–Symbol score* was centered at the older participants' mean for this analysis.

working with their spouses given a more difficult task. To address this question, I repeated the analyses reported in the previous section (predicting the familiarity effect by the explaining partner's cognitive-mechanic skills) while considering the aspect of the difficulty of the targets. *Target difficulty* was empirically determined by the mean number of words that all participants needed on average to explain a given target, across both age groups, and across both experimental conditions.
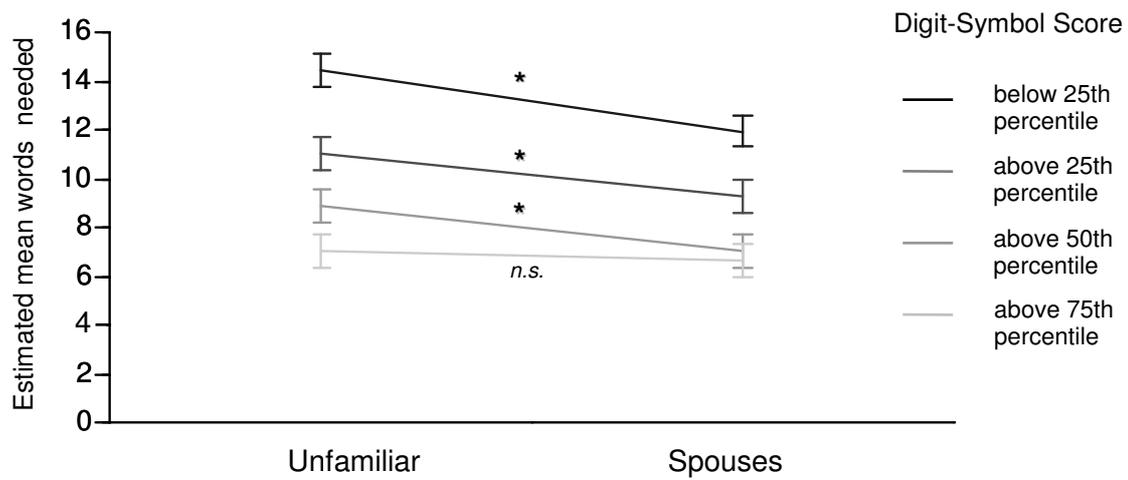
Figure 3.3. The familiarity effect as a function of participants' Digit–Symbol score. Bars show estimated subsample means as obtained from MLM using the log-transformed distribution of the dependent variable. Error bars indicate 95% confidence intervals. Estimated means and confidence intervals were re-transformed and are shown in the real metric of the dependent variable. * $p <$ .05, *n.s.* not significant.

When excluding easy targets and just using the more difficult targets (median split of all targets), the pattern of results was generally consistent with the previous analysis. Although the interaction effect of *partners' familiarity* and *Digit–Symbol score* when predicting performance was no longer significant in this analysis ($\beta_{partners' familiarity \, x \, Digit–Symbol \, score}$ = .001, t = .82 [1400], *n.s.*),[31] the pattern of results for the four quartiles of the Digit–Symbol distribution was similar to the one observed for the total sample of targets: The effect of *partners' familiarity* was significant for all participants except for the group of persons with the highest Digit–Symbol score in the sample. The estimates from these analyses can be seen in the Appendix (Table A8). Accordingly, the three-way interaction effect of the continuous measure of *Digit–Symbol score*, *partners' familiarity*,

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[31] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = .03, t = .89 [73.8], *n.s.*), *use of forbidden words* (β = -.45, t = -3.93 [1658], $p <$ .05), *partners' familiarity* (β = -.07, t = -4.95 [1542], $p <$ .05), *explaining partners' Digit–Symbol score* (β = -.01, t = -4.06 [258], $p <$ .05), *guessing partner's Digit–Symbol score* (β = -.004, t = -3.96 [170], $p <$ .05).

and *target difficulty* when predicting performance was not significant ($\beta = .0003$, $t = .93$ [3351], *n.s.*).[32] This indicates that the very skilled people in the sample did not perform reliably better with their spouses than with the unfamiliar partner – even when confronted with more difficult targets.

3.1.3 Follow-up Analyses: The Role of Social Variables

In part 1, it was suggested that repeated interactive practice with a given interaction partner would result in superior collaborative performance. This may imply a particularly strong effect of partners' familiarity on performance if the familiar partners can build on extensive interactive practice. In the following, I will report on follow-up analyses that include two variables from the participants' social lives: the size of participants' *social network* outside the partnership and couples' *relationship duration*. These variables were chosen as possible indicators of the amount of couples' collaborative practice that I assumed to be related to the effect of partners' familiarity on their performance in the Taboo study.

3.1.3.1 Social-Network Size

The degree of interactive expertise among familiar couples might be related to the number of alternative social partners (other than the very relationship partner). I assumed that the effect of *partners' familiarity* on performance would be stronger in persons who, in their social interactions, tend to primarily focus on their relationship partner, and engage less in contact with alternative interaction partners. Again, the baseline model for the total sample was used, and the explaining partner's number of social network partners was added as a fixed effect (for simplicity, this predictor will be referred to as *social network*). In the total sample, the familiarity effect did not depend on the size of participants' reported *social network* ($\beta_{\text{Social Network x Partners' Familiarity}} = .0004$, $t = .28$ [981], *n.s.*).[33] However, there was a significant three-way interaction effect of *age group*, *partners' familiarity,* and the continuous measure of participants' *social network* when predicting

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[32] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* ($\beta = .02$, $t = .79$ [71.7], *n.s.*), *use of forbidden words* ($\beta = -.43$, $t = -6.30$ [3353], $p < .05$), *partners' familiarity* ($\beta = -.05$, $t = -5.39$ [3259], $p < .05$), *explaining partners' Digit–Symbol score* ($\beta = -.01$, $t = -4.44$ [221], $p < .05$), *guessing partner's Digit–Symbol score* ($\beta = -.004$, $t = -4.24$ [166], $p < .05$), *target difficulty* ($\beta = .04$, $t = 13.72$ [3335], $p < .05$), Interaction *Explaining Partners' Digit–Symbol Score* x *Partners' Familiarity* ($\beta = .002$, $t = 2.09$ [2803], $p < .05$), Interaction *Explaining Partners' Digit–Symbol Score* x *Target Difficulty* ($\beta = -.0001$, $t = -.68$ [3342], *n.s.*), Interaction *Partners' Familiarity* x *Target Difficulty* ($\beta = -.003$, $t = -.94$ [3346], *n.s.*).

[33] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* ($\beta = -.003$, $t = -.08$ [71.7], *n.s.*), *use of forbidden words* ($\beta = -.35$, $t = -4.62$ [3257], $p < .05$), *social network* ($\beta = -.001$, $t = -.67$ [180], *n.s.*), *partners' familiarity* ($\beta = -.06$, $t = -5.67$ [3222], $p < .05$).

performance (estimate for the interaction effect: $\beta = -.01$, $t = -3.06$ [840], $p < .05$).[34] Table 3.3 provides an overview of the results on the interaction effects among the variables of participants' *age group*, reported *social network*, and *partners' familiarity* when predicting performance, which I will describe in the following.

Table 3.3

Predicting the Number of Words Needed to Cue the Partner: Overview of the Follow-Up Analyses on the Role of Participants' Social-Network Size

	Parameter Estimates		
	β	t	df
Interaction effect of *partners' familiarity* and *age group*, split by social-network size [a]			
Subsample reporting a smaller social network	-.07 *	-2.33	384
Subsample reporting a larger social network	.05	1.39	341
Three-way interaction effect of partners' familiarity, social network,[b] and age group			
Total sample of spouses	-.01*	-3.06	840

[a] Age-specific median split. [b] Continuous measure of participants' social-network size.

Note. The number of words needed is predicted (log-transformed distribution). * $p < .05$.

The three-way interaction indicates that participants' reported social-network size moderated the effect of *partners' familiarity* on performance in an age-differential way. Follow-up analyses on this interaction effect revealed that only among persons with a smaller reported social network outside the partnership (age-specific median split), the effect of *partners' familiarity* on performance was greater in older adults than in younger adults (estimate for the interaction effect of *Age Group* x *Partners' Familiarity* given a smaller *social network*: $\beta = -.07$, $t = -2.39$ [561], $p < .05$).[35] This interaction effect was not significant in participants who reported a larger social-network

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[34] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* ($\beta = .01$, $t = .33$ [76.7], *n.s.*), *use of forbidden words* ($\beta = -.36$, $t = -4.76$ [3267], $p < .05$, *social network* ($\beta = -.004$, $t = -1.93$ [218], *n.s.*), *age group* ($\beta = .27$, $t = 9.34$ [113], $p < .05$), *partners' familiarity* ($\beta = -.04$, $t = -2.97$ [3236], $p < .05$), Interaction *Social Network* x *Partners' Familiarity* ($\beta = -.004$, $t = -2.06$ [849], $p < .05$), *Interaction Age Group* x *Partners' Familiarity* ($\beta = -.01$, $t = -.66$ [3234], *n.s.*), *Interaction Age Group* x *Social Network* ($\beta = .01$, $t = 2.49$ [230], $p = .05$).

[35] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* ($\beta = .04$, $t = 1.13$ [52.6], *n.s.*), *use of forbidden words* ($\beta = -.34$, $t = -3.17$ [1735], $p < .05$), *age group* ($\beta = .21$, $t = 5.36$ [74.7], $p < .05$), *partners' familiarity* ($\beta = -.02$, $t = -.91$ [536], *n.s.*).

size (estimate for the interaction effect of *Age Group* x *Partners' Familiarity* given a larger social network: $\beta = .05$, $t = 1.41$ [469], *n.s.*).[36]

Figure 3.4 shows the observed performance in the Taboo task, separately for younger and older participants, for familiar and unfamiliar dyads, and for participants with a reported smaller, and a larger social network. As reflected by the above reported analyses, this figure illustrates how participants' reported social-network size moderated the effect of partners' familiarity on performance in an age-differential way.
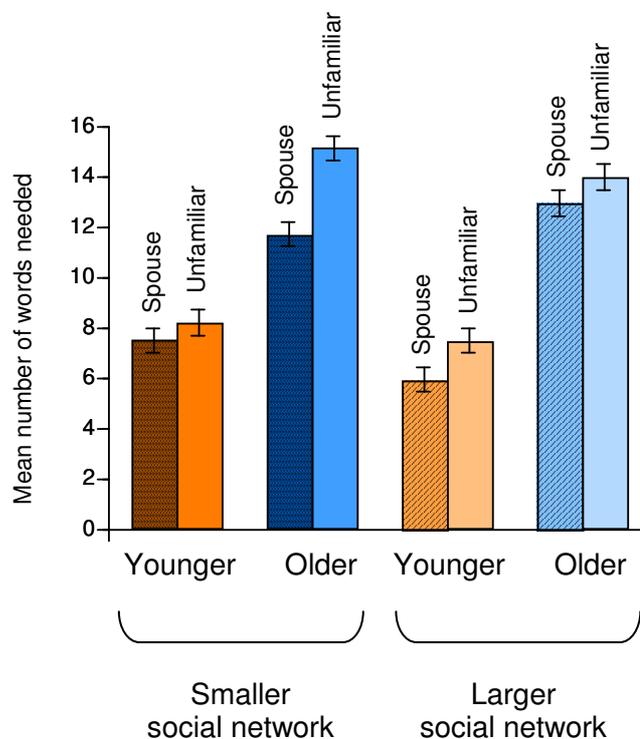
Figure 3.4. Participants' mean performance by age group, experimental condition, and social-network size. Because of the arbitrary nature of the median split by social-network size, bars show the observed subsample means. Error bars indicate standard errors for subsample means. The depicted median-split illustration may be considered an approximate but simplified account of the reported results that were obtained from MLM using the log-transformed distribution of the dependent variable and social-network size as a continuous measure.

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[36] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* ($\beta = -.02$, $t = -.68$ [42.9], *n.s.*), *use of forbidden words* ($\beta = -.38$, $t = -3.55$ [1547], $p < .05$), *age group* ($\beta = .32$, $t = 8.50$ [79.6], $p < .05$), *partners' familiarity* ($\beta = -.80$, $t = -3.52$ [611], $p < .05$).

To further investigate this age-differential association, I investigated the interaction effect of *partners' familiarity* and *social network* separately for the two age groups. Results showed a significant negative interaction effect of *partners' familiarity* and *social network* when predicting performance in the older subsample ($\beta_{\text{Partners' Familiarity x Social Network}}$ = -.005, t = -2.22 [466], $p < .05$).[37]

Thus, older adults profited more from working with their spouses if they reported a smaller social network. In the subsample of younger adults, the opposite was found: There was a significant positive interaction effect of *partners' familiarity* and *social network* when predicting younger adults' performance ($\beta_{\text{Partners' Familiarity x Social Network}}$ = .004, t = 2.20 [373], $p < .05$),[38] indicating that younger adults profited more from working with their spouses if they reported a larger social network. I will discuss these findings in detail in part 4.

One theoretically intriguing question is in which experimental condition participants' performance was more strongly associated with their social-network size. The size of participants' social network may be associated with how well they performed with their spouses. Also, it is possible that participants' network size was primarily associated with their task performance when interacting with the unfamiliar partner. Third, it is possible that participants' performance in both conditions was differentially predicted by their social-network size. This question was addressed in an explorative way by splitting the sample by age group and condition, and testing the effect of participants' social network (as a continuous variable) on performance.[39]

Results indicated that the performance with the unfamiliar partner was not associated with participants' social-network size: both younger adults' and older adults' social network did not predict their performance with the *unfamiliar partner*.[40] However, both in younger and in older adults, their social-network size was associated with how well they performed with their *spouses*. Younger adults needed fewer words to cue their spouses if they reported a comparatively large social network ($\beta_{\text{social network}}$ = -.01, t = -4.79 [883], $p < .05$).[41] In contrast, older adults needed more

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[37] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = .01, t = .35 [43.3], *n.s.*), *use of forbidden words* (β = -.52, t = -5.45 [1564], $p < .05$), *social network* (β = .004, t = .43 [107], *n.s.*), *partners' familiarity* (β = -.06, t = -4.46 [1560], $p < .05$).

[38] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = .01, t = .19 [33.5], *n.s.*), *use of forbidden words* (β = -.10, t = -.76 [1701], *n.s.*), *social network* (β = -.004, t = -1.95 [112], $p = .05$.), *partners' familiarity* (β = -.05, t = -3.51 [1639], $p < .05$).

[39] The split by condition required omitting the three random components at level 2 of the model (random effect for the explaining partner, the guessing partner, and the explaining partner's partnership) from this specific model to allow for convergence.

[40] Predicting the number of words needed (log-transformed distribution). Estimates for younger adults: *social network*: β = -.002, t = -1.91 [867], *n.s.*; *order of conditions*: β = .06, t = 2.76.91 [867], $p < .05$; use of forbidden words: β = .08, t = .41 [867], *n.s.* Estimates for older adults: *social network*: β = -.002, t = -1.22 [810], *n.s.*; order of conditions: β = .02, t = .63 [810], *n.s.*; use of forbidden words: β = -.69, t = 4.68 [810], $p < .05$.

[41] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = -.07, t = -3.39 [883], *p < .05*), *use of forbidden words* (β = -.07, t = -.36 [883], *n.s.*).

words to cue their spouses if they reported a larger network ($\beta_{\text{social network}}$ = .003, t = 2.00 [883], p < 05).[42] Implications of this finding will be addressed in the discussion (part 4).

3.1.3.2 Relationship Duration

As an additional variable that might moderate the benefits of familiarity, I considered couples' relationship duration. It seems plausible that, the longer two partners have been steadily engaged in the partnership, the more interactive practice they might have acquired. As mentioned before in part 2, older couples with a shorter relationship are rare in the normal population. Accordingly, the two subsamples of younger and older adults were not stratified with respect to this variable, and within the total sample, the variable featured a negative kurtosis due to two capital peaks (in the distribution of relationship duration) reflecting the two age groups' means. Total-sample analyses regarding the effect of relationship duration would have led to a biased view on the role of relationship duration because participants' age group (being a significant predictor of performance) was strongly confounded with relationship duration. Follow-up analyses on *relationship duration* will therefore be reported separately for younger and older adults. A summary of the results of the analyses on the role of couples' relationship duration is provided in Table 3.4.

Within the subsample of older participants, there was no significant interaction effect of (the continuous measure of) *relationship duration* and *partners' familiarity* when predicting performance (βRelationship Duration x Partners' Familiarity = .001, t = .50 [773], *n.s.*).[43] This indicates that the familiarity effect for older adults was not moderated by the older couples' relationship duration. In contrast, the corresponding interaction effect was significant in the subsample of younger adults (βRelationship Duration x Partners' Familiarity = .03, t = 5.04 [311], p < .05.).[44] Additional analyses for the subsample of younger adults were performed after splitting the younger subsample at their age group-specific median (4.5 years) of *relationship duration*. These analyses revealed that younger participants with a shorter relationship (i.e., less than 4.5 years) did not perform any better when working with their spouses as compared to working with an unfamiliar partner (which was

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[42] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = -.04, t = -1.91 [814], *n.s.*), *use of forbidden words* (β = -.41, t = -.2.84 [814], p < .05).

[43] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = .03, t = .79 [42.4], *n.s.*), *use of forbidden words* (β = -.57, t = -6.40 [1669], p < .05), *relationship duration* (β = -.001, t = -.56 [54.3], *n.s.*), *partners' familiarity* (β = -.07, t = -4.79 [1620], p < .05).

[44] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = .01, t = .12 [33.2], *n.s.*), *use of forbidden words* (β = -.10, t = -.77 [1703], *n.s.*), *relationship duration* (β = -.02, t = -2.23 [43.3], p < .05), *partners' familiarity* (β = -.05, t = -3.52 [1638], p < .05).

estimated with $\beta_{\text{partners' familiarity}}$ = .03, t = 1.28 [335], *n.s.*).[45] In contrast, younger adults with a longer relationship (i.e., more than 4.5 years) needed significantly fewer words to cue their spouse than to cue an unfamiliar partner ($\beta_{\text{partners' familiarity}}$ = -.12, t = -5.78 [188], p < .05).[46] Figure 3.5 illustrates this interaction effect by directly contrasting participants' observed mean performance with the spouse, and the observed mean performance with the unfamiliar partner. This comparison is shown for younger couples with a shorter relationship, for younger couples with a longer relationship, and for the total subsample of older couples.

Table 3.4
Predicting the Number of Words Needed to Cue the Partner: Overview of the Follow-Up Analyses on the Role of Couples' Relationship Duration

	Parameter Estimates		
	β	t	df
Main effect of *partners' familiarity* [a]			
Total subsample of younger adults	-.05 *	-3.53	1639
Total subsample of older adults	-.07 *	-4.79	1621
Main effect of *partners' familiarity* after median split [a] (younger subsample only)			
Younger adults with a shorter relationship	.03	1.28	335
Younger adults with a longer relationship	-.12 *	-5.78	188
Interaction effect of *relationship duration* [b] and *partners' familiarity* [a]			
Younger adults	.03 *	5.04	311
Older adults	-.001	-0.50	773

[a] When predicting the number of words needed. [b] Continuous measure of couples' relationship duration. * p < .05.

To follow up on this interaction effect in younger couples with a longer relationship, I investigated whether this differential pattern in younger adults could be attributed to better performance among long-term partners, or to their worse performance when interacting with the unfamiliar partner (as compared to younger couples with a shorter relationship). To test this, the younger age group was split by condition. I then tested a model predicting participants'

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[45] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = .004, t = .08 [17.3], *n.s.*), *use of forbidden words* (β = .11, t = .54 [848], *n.s.*).
[46] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = -.001, t = -.01 [16.5], *n.s.*), *use of forbidden words* (β = -.20, t = -1.19 [861], *n.s.*).

performance by their relationship duration.[47] This showed that younger couples with a longer relationship needed fewer words to cue their spouses as compared to younger couples with a shorter relationship (βrelationship duration $= -.02$, $t = -.86$ [883], $p < .05$).[48] At the same time, participants with a longer relationship needed more words to cue the unfamiliar partner than participants with a shorter relationship (βrelationship duration $= .01$, $t = 2.15$ [867], $p < .05$).[49]
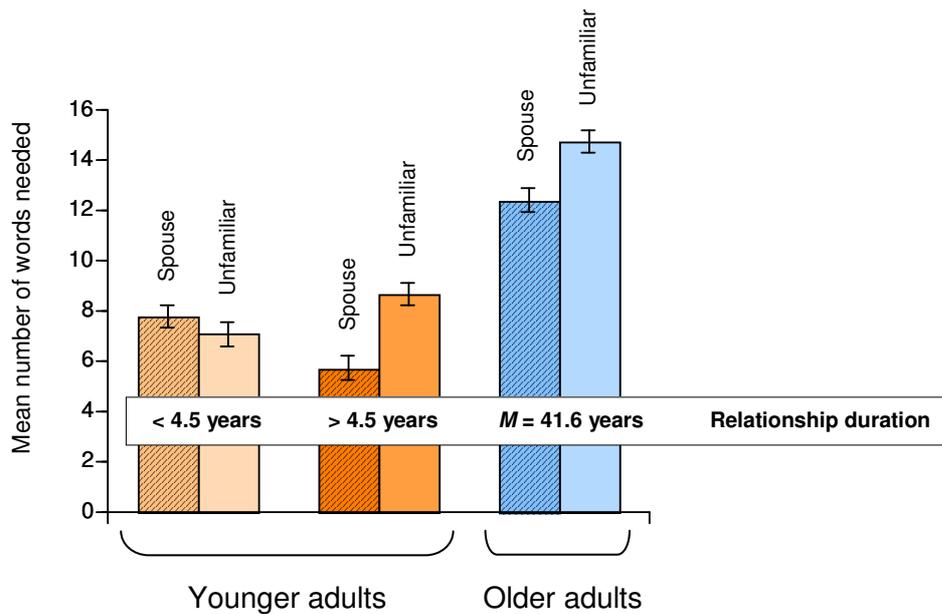
Figure 3.5. Effect of partners' familiarity on performance in younger couples with a shorter relationship, in younger couples with a longer relationship, and in older couples. Because of the arbitrary nature of the median split by younger couples' relationship duration, bars show the observed subsample means. Error bars indicate standard errors for subsample means. The depicted median-split illustration may be considered an approximate but simplified account of the reported results that were obtained from MLM using the log-transformed distribution of the dependent variable and relationship duration as a continuous measure.

The effect of *partners' familiarity* in the subsample of younger participants with a longer relationship was even stronger than the corresponding effect in the total subsample of older adults (the latter was estimated with βpartners' familiarity for the older subsample $= -.07$, $t = -4.79$ [1621],

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[47] The split by condition required omitting the three random components at level 2 of the model (random effect for the explaining partner, the guessing partner, and the explaining partner's partnership) from this specific model to allow for convergence.

[48] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* ($\beta = .06$, $t = 2.70$ [883], $p < .05$), *use of forbidden words* ($\beta = -.06$, $t = -.29$ [883], *n.s.*).

[49] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* ($\beta = -.05$, $t = -2.12$ [867], $p < .05$), *use of forbidden words* ($\beta = -.07$, $t = -.39$ [867], *n.s.*).

$p < .05$),[50] as indicated by an additional follow-up analysis: When performing an analysis with all older adults, and only those younger participants with a longer relationship, there was a significant interaction effect of *age group* and *partners' familiarity* when predicting performance ($\beta_{Partners'\ Familiarity\ x\ Age\ Group} = .06$, $t = 2.22$ [1360], $p < .05$.).[51] I will discuss these findings in detail in the part 4.

3.1.4 Did the Number of Taken Guesses Contribute to the Familiarity Effect?

The reasons for choosing the *number of words* needed to explain the target as the dependent variable have been outlined in part 2. I regard this measure as an indicator of collaborative performance as it reflects both the explaining partner's efficiency when cueing the partner, and the guessing partner's abilities to process the provided information and produce the correct response based on this information. This measure therefore serves as an indirect indicator of the guessing partner's contribution. One may, however, speculate that this approach neglected a more direct influence of the partner in the form of wrong guesses. Guesses taken by the partner may serve as a catalyst for the collaborative process of arriving at the correct response as they can provide the explaining partner with feedback on how the previous cues have been processed, and enable him or her to adjust the subsequent cues to this feedback. It is conceivable that the threshold for taking guesses was lower among spouses, implying that they used a more interactive working style than unfamiliar dyads did. Therefore, feedback to the explaining partner might have occurred more frequently among spouses than among unfamiliar partners. To investigate this possibility, a model was developed that featured *partners' familiarity* as the predictor, and the *number of guesses* that were taken in a given trial as the dependent variable (see Appendix, section 6.4, for the development of this model). *Partners' familiarity* was a significant predictor of the *number of guesses*. However, in contrast to what might be expected, spouses actually took fewer guesses than unfamiliar partners ($\beta_{partners'\ familiarity} = -.11$, $t = -2.03$ [3271], $p = .04$).[52] To complement the chosen indicator of collaborative performance (the number of words needed to explain a target) by a closer look at the role of feedback loops through wrong guesses, I repeated all analyses reported

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[50] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* ($\beta = .02$, $t = .67$ [43.3], *n.s.*), *use of forbidden words* ($\beta = -.57$, $t = -6.37$ [1671], $p < .05$).

[51] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* ($\beta = .02$, $t = .52$ [58], *n.s.*), *use of forbidden words* ($\beta = -.48$, $t = -6.11$ [2529], $p < .05$), *age group* ($\beta = 32$, $t = 8.83$ [78.9], $p < .05$), *partners' familiarity* ($\beta = -.12$, $t = -5.68$ [874], $p < .05$).

[52] The model predicted the number of wrong guesses taken until the target word was guessed correctly. Additional predictors: *order of conditions* ($\beta = -.01$, $t = -.10$ [163], *n.s.*), *use of forbidden words* ($\beta = -.83$, $t = -2.06$ [3444], $p = .04$). When controlling for the number of cues provided by the explaining partner, the effect of *partners' familiarity* was rendered non-significant ($\beta = -.08$, $t = -1.77$ [3264], *n.s.*), suggesting that the main effect of *partners' familiarity* was a function of a longer, rather than a less interactive nature of the trials among unfamiliar partners.

in section 3.1 while controlling for the *interactive nature* of a trial. This variable was defined as the number of guesses taken in a trial, divided by the number of cues provided (as guesses were mostly uttered after a cue was completed). This ratio therefore served as an indicator of the relative frequency of feedback in a given trial. Repeating the analyses while controlling for the *interactive nature* of a trial did not change any of the results reported in section 3.1.[53]

3.1.5 Interim Summary: The Effect of Partners' Familiarity on Performance

In section 3.1, I reported analyses and results pertaining to the first research question that asked about age-differential benefits for collaborative performance from working with a familiar, as opposed to working with an unfamiliar partner.

The present study provided empirical evidence for Hypothesis 1.1: Results revealed a significant effect of partners' familiarity when predicting performance in the total sample of participants. Spouses generally required fewer words than unfamiliar partners to cue each other in the experimental task. Hypothesis 1.2 predicted that the effect of partners' familiarity for performance would be stronger in older, as compared to younger adults. Results provided no empirical support for such an age-differential effect in the present sample. Instead, younger and older adults profited to a comparable degree from working with their spouses, as compared to working with an unfamiliar partner.

Follow-up analyses on the effect of partners' familiarity on their performance focused on three moderating factors, namely, participants' *Digit–Symbol score* as an indicator of their cognitive-mechanic skills, the size of participants' reported *social network*, and couples' *relationship duration*. Along these three strands of follow-up analyses, the main results can be summarized as follows:

First, the effect of partners' familiarity on performance was greater in participants with a lower Digit–Symbol score, irrespective of participants' age. Participants with the highest Digit–Symbol scores (above the 75th percentile of the total sample distribution) did not perform differently with an unfamiliar partner than with their spouses. Participants with lower Digit–Symbol scores (below the 75th percentile) performed reliably better with their spouses than with an unfamiliar partner.

Second, there was a significant interaction effect of participants' age group, reported social-network size, and partners' familiarity when predicting performance. Only in the

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[53] It should be noted that the assumption of normality was violated for the measure of wrong guesses taken. As outlined in Part 2, wrong guesses were relatively rare in the present sample, and the measure displayed severe kurtosis and positive skewness (cf. Appendix, Table A5). The distribution could not be ameliorated by transformations. The single result from the analysis using the number of guesses as the dependent variable should therefore be interpreted with caution. Insights provided by the additional analyses using the *interactive nature* of a trial as a control variable on the predictor side can be considered more reliable.

subsample of participants who reported a smaller social network outside their partnership, older adults profited more than younger adults from working with their partners (as opposed to working with an unfamiliar partner). In the subsample of participants who reported a larger social network, the effect of partners' familiarity when predicting task performance was not significantly different for younger and older adults. Considering interpersonal differences within the younger subsample, those younger adults who reported a larger social network profited more from working with their spouses, as compared to younger adults with a comparatively smaller social network.

Third, there was a significant interaction effect of partners' familiarity and the couples' relationship duration in the younger subsample. The effect of partners' familiarity on performance was more pronounced in younger adults with a longer relationship, as opposed to younger adults with a shorter relationship. Within the older subsample, the interaction effect was not significant, indicating that older adults' performance benefit from working with their spouses did not reliably depend on their relationship duration.

3.2 The Use of Dyadic Common Ground and its Effect on Performance

This section will address the second research question regarding the usefulness of dyadic common ground for collaborative performance, and the hypothesized age-differential effects in this regard. First, I will focus on predictors for participants' spontaneous *use* of dyadic common ground. I will describe the analyses that investigated whether the two experimental manipulations elicited the use of dyadic common ground, as assumed when planning the experimental design (section 3.2.1). Also, analyses will be reported that explored possible age differences in the spontaneous use of dyadic common ground. After this, I will turn to the analyses regarding Hypotheses 2.1 and 2.2 and focus on the *effect* of dyadic common ground as a cueing strategy on younger and older couples' performance (section 3.2.2).

3.2.1 Effects of the Design Factors on the Use of Dyadic Common Ground

As introduced in section 2.3, two experimental within-person manipulations (partners' familiarity and the everyday-life reference of the target word) and one between-person factor (age group) were included in the present study design. The two experimental manipulations were implemented to enlarge the variance in participants' spontaneous use of dyadic common ground in their cueing. In this section, I will describe analyses that I performed to test whether these factors exerted the assumed effect on the likelihood that this particular cueing strategy was used.

I will first describe how participants' tendency to refer to dyadic common ground in their cueing was affected by the two experimental manipulations of partners' familiarity (section 3.2.1.1) and the everyday-life reference of the target word (section 3.2.1.2). I will then report on the analyses that investigated age differences in the use of dyadic common ground (section 3.2.1.3). The results reported in section 3.2.1 were obtained from multilevel logistic regression models implemented in SAS PROC GLIMMIX. Unlike PROC MIXED, which was used for all analyses when testing the hypotheses (see part 2), the SAS GLIMMIX procedure offers the option to include dependent measures which are not normally distributed. This poses a particular advantage for the purpose of predicting participants' use of dyadic common ground in the present experiment. The continuous measure of dyadic common ground (as indicated by the frequency of this strategy, relative to all cues used in a trial) did not lend itself for these analyses, as this variable displayed kurtosis (see Table A5 in the Appendix) and was therefore not considered suitable in any analyses that used this variable as criterion. Using PROC GLIMMIX, the use of dyadic common ground could be considered as a dichotomous outcome measure, indicating whether dyadic common ground was used to explain a target in a given trial or not. Like the models estimated by the mixed procedure, the models implemented in PROC GLIMMIX accounted for the interdependencies among the multiple trials completed in a session by including a random effect for the trial. However, no further random effects were included in these models to allow for convergence.

3.2.1.1 Partners' Familiarity

The interaction partners' familiarity was assumed to be a crucial precondition of using dyadic common ground. A multilevel logistic regression was performed in SAS PROC GLIMMIX to test this assumption. The total sample of valid trials was used in this analysis (i.e., both those trials completed among spouses, and those completed among unfamiliar partners, $N = 3496$), and dyadic common ground was included as a dichotomized trial-wise outcome variable (indicating if dyadic common ground was used at all at any point in time during a given trial). The experimental factor of *partners' familiarity* was used as a predictor.

The results confirmed that partners' familiarity was a significant predictor of the use of dyadic common ground in the total sample (log-odds ratio = 2.58, $t = 21.45$, [3494], $p < .05$), indicating that participants used dyadic common ground in more targets when cueing their spouses than when cueing the unfamiliar partner. As can be seen in Table 3.5, on average, spouses explained 41% of all targets by referring to dyadic common ground. In contrast,

unfamiliar partners only explained 5% of all targets on average by using dyadic common ground.[54]

Table 3.5
Frequency Information: Percent of Completed Targets Explained With Reference to Dyadic Common Ground

Subsample of spouses			
	Range	*M*	*SD* [1]
Total subsample	0–83%	41%	19
Younger spouses	0–83%	37%	17
Older spouses	0–83%	45%	19
Subsample of unfamiliar partners			
	Range	*M*	*SD* [1]
Total subsample	0–42%	5%	8
Younger unfamiliar partners	0–30%	4%	6
Older unfamiliar partners	0–42%	7%	9

[1] Standard deviations from personal means.

3.2.1.2 *Everyday-Life Reference of the Target Words*

It was assumed that targets would elicit the use of dyadic common ground if they offered reference to (potentially shared) everyday-life issues. As described in part 2, the information on the everyday-life reference of the target words was obtained from the independent word-rating pre-study. To investigate whether the use of dyadic common ground could actually be predicted by the everyday-life reference of the targets, I again performed a multilevel logistic regression implemented in SAS PROC GLIMMIX, using dyadic common ground as a dichotomous, trial-wise outcome measure, and the *everyday-life reference* of the target words as a predictor. Due to the very low frequency of this strategy among unfamiliar partners, this analyses relied on the valid trials completed among spouses only (*n* = 1763).

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[54] The use of dyadic common ground with an unfamiliar partner was possible in principle (i.e., the coding schemes of dyadic common ground were applied equally to spouses and unfamiliar dyads). In most of these rare cases, those cues pointed to previous trials completed with this partner, as this was the only base of shared experiences among unfamiliar interaction partners. In single, very rare cases among unfamiliar dyads, the explaining partner used pieces of knowledge that could not possibly be available to the unfamiliar partner. It did, for example, occur that participants referred to their personal past which was unknown by the unfamiliar partner, and dyadic common ground in this domain was falsely assumed.

As expected, the *everyday-life reference* of the target word predicted the use of dyadic common ground (log-odds ratio= .45, t = 7.61, [1761], p < .05), indicating that dyadic common ground was more frequently used in targets with a higher everyday-life reference, as determined by the independent pre-study.

3.2.1.3 *Participants' Age Group*

In a last step, I tested whether participants' age group was a predictor for the use of dyadic common ground. Due to the very low frequency of dyadic common ground in the sample of unfamiliar dyads, this was only done for the subsample of valid trials that were completed with the spouse (n = 1763). Like in the model used in the previous analyses on the role of the targets' everyday-life reference, the trial-wise, dichotomous measure of dyadic common ground was again included as the criterion. Participants' *age group* was entered as a predictor.

Results revealed that when cueing their spouses; older spouses referred to dyadic common ground in more trials than did younger adults (log-odds ratio = .31, t = 3.21, [1761], p < .05). As can be seen in Table 3.5, younger adults explained 37% of all targets on average by using dyadic common ground when cueing their spouses. Older adults used dyadic common ground more often, namely in 45% of all target words on average.

In sum, the analyses on the frequency of dyadic common ground showed that all three experimental factors (among them the quasi-experimental factor of participants' age group) exerted a significant effect on the degree to which participants referred to dyadic common ground in their cueing. Both experimental manipulations (partners' familiarity and the everyday-life reference of the target word) altered participants' tendency to use dyadic common ground in the assumed direction: Dyadic common ground was almost exclusively used among spouses (as compared to unfamiliar interaction partners), and spouses used it more frequently when explaining targets that were related to their everyday lives. Older adults referred to dyadic common ground more often than younger adults when cueing their spouses.

3.2.2   Age-Differential Effect of Dyadic Common-Ground Cues on Performance

In this section, I will address Hypotheses 2.1 and 2.2. In Hypothesis 2.1, I predicted a general effect of dyadic common ground on collaborative performance for the total sample, namely, that using dyadic common ground would allow spouses to reduce the words needed to cue each other. In Hypothesis 2.2, I assumed that the effect of dyadic common ground on performance would be greater in older than in younger adults. As mentioned in the previous

section, dyadic common ground was almost never used among unfamiliar partners. Therefore, the analyses performed to test the effect of dyadic common ground on performance only relied on the subsample of valid trials completed among spouses ($n = 1763$). All MLM analyses reported in section 3.2.2 were performed in SAS PROC MIXED (cf. part 2). The analyses will use a relative measure of dyadic common ground as a predictor for spouses' performance. As outlined in part 2, this was done because dyadic common ground was coded with respect to each individual cue, which implies that a high number of cues in an explanation raised the probability that dyadic common ground was included in any of the used cues. Therefore, a relative measure for dyadic common ground was calculated that indicated the proportion of dyadic common-ground cues, relative to all cues used over the course of an explanation for a given target.

The effect of dyadic common ground on couples' performance was tested by a multilevel model that built on the baseline model developed for the subsample of spouses (see Equations 3 and 4 in part 2) and included a main effect of the use of *dyadic common ground,* a main effect of *age group*, and the respective interaction effect (*Dyadic Common Ground* x *Age Group*).

In line with Hypothesis 2.2, there was a significant interaction effect of the degree to which participants used *dyadic common ground* with participants' *age group* when predicting spouses' performance ($\beta_{\text{Use of Dyadic Common Ground x Age Group}} = -.07$, $t = -2.05$ [1718], $p < .05$). The parameter estimates for all predictors included in this analysis can be seen in Table 3.6.

Table 3.6
Interaction Effect of Dyadic Common Ground and Age Group When Predicting Spouses' Performance (n = 1763 Trials)

Fixed effects	Parameter Estimates		
	β	t	df
Interaction effect of participants' age group and dyadic common ground	**-.07 ***	**-2.05**	**1718**
Main effect of participants' age group	.26 *	8.72	75.5
Main effect of dyadic common ground	.01	0.59	1710
Order of conditions	.06 *	2.03	75
Use of forbidden words	-.34 *	-3.18	1700

* $p < .05$. Estimates for the main predictor of interest are printed in boldface.

Follow-up analyses also supported the hypothesized direction of this age-differential effect: Older adults' performance profited significantly from using dyadic common ground

($\beta_{\text{dyadic common ground}}$ = -.06, t = -2.32 [853], p < .05).[55] In younger adults, however, using dyadic common ground did not cause any significant change in participants' performance ($\beta_{\text{dyadic common ground}}$ = .02, t = .66 [864], *n.s.*).[56] Figure 3.6 illustrates the estimated effect of using dyadic common ground on younger and in older adults' task performance.
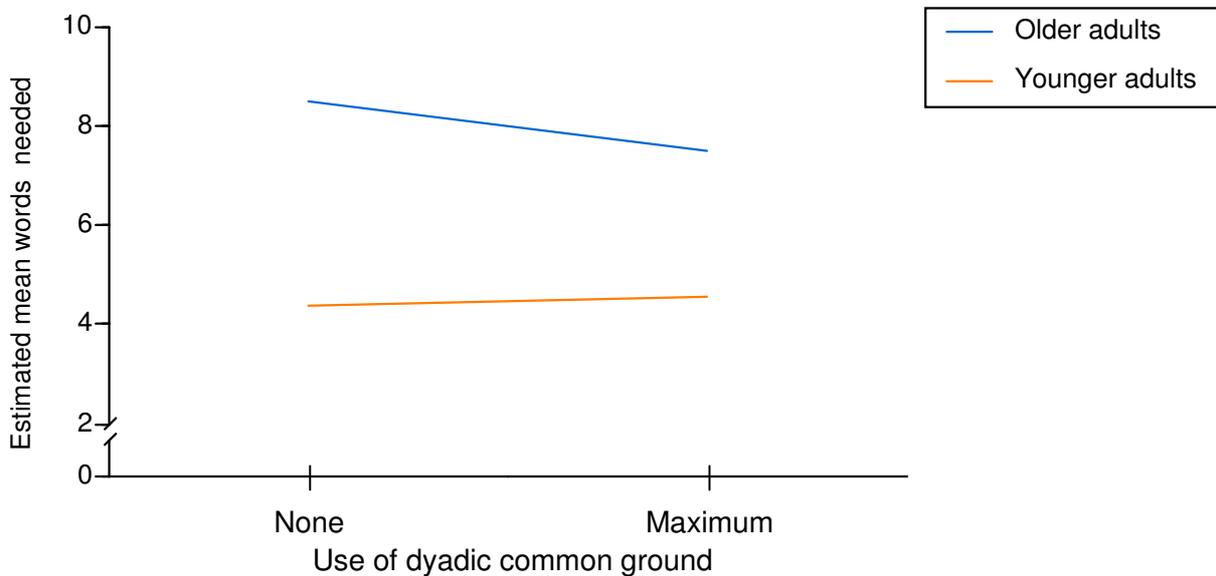
Figure 3.6. Estimated effects of using dyadic common ground on younger and in older couples' performance, shown in the real metric of the dependent variable (words needed). Estimates were obtained from MLM using the log-transformed distribution of the dependent variable (n = 1763 trials).

3.2.3   Follow-Up Analyses: The Role of Cognitive-Mechanic Skills

The conceptual framework of this dissertation proposes that the use of dyadic common ground with a familiar partner may be used as a compensatory strategy when collaborating on a cognitive task. This may help older adults to make up for aging-related losses in cognitive-mechanic skills. So far, I have reported on findings showing that older people were well able to *use* this strategy (section 3.2.1) and that using dyadic common ground was associated with better performance in older adults (section 3.2.2). A crucial remaining question is whether the outcome of using dyadic common ground in older persons depended on their cognitive-mechanic skills. More precisely, the question is whether older participants with lower cognitive-mechanic competencies (as compared to other older participants) profited more from using dyadic

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[55] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = .05, t = 1.26, [37.9], *n.s.*), *use of forbidden words* (β = -.44, t = -3.33 [844], *p* < .05).
[56] Predicting the number of words needed (log-transformed distribution). Additional predictors: *order of conditions* (β = .08, t = 1.60 [36], *n.s.*), *use of forbidden words* (β = -.11, t = -.64 [853], *n.s.*).

common ground, as compared to older persons with higher cognitive-mechanic competencies. Alternatively, it is possible that the usefulness of this cueing strategy in older adults was independent of participants' cognitive-mechanic skills, or that the effectiveness of this strategy may have even been restricted by the intellectual resources available to a person.

To address this question, the analyses testing the interaction effect of *dyadic common ground* with participants' *age group* were repeated while controlling for participants' *Digit–Symbol score* as a marker of aging-related changes in cognitive mechanics. The beneficial effect of using dyadic common ground for performance in the older sample was robust to controlling for the explaining participant's *Digit–Symbol score* (entered as an additional fixed effect), as well as to controlling for the guessing partner's respective *Digit–Symbol score*, and controlling for both spouses' scores simultaneously. The interaction effect of *dyadic common ground* with participants' *age group* when predicting spouses' performance was also robust to this controlling for participants' *Digit–Symbol scores*. Moreover, there was no interaction effect of participants' *Digit–Symbol scores* with the effect of *dyadic common ground* when predicting performance ($\beta = .001$, $t = .63$ [1712], *n.s.*).[57] Thus, the benefit of using dyadic common ground for older participants' performance was independent of their cognitive-mechanic skills as reflected by the Digit–Symbol Substitution Test.

3.2.4 Follow-Up Analyses: The Role of Target Difficulty

I reported in section 3.2.2 that there was an age-differential effect of using dyadic common ground on performance: Although younger couples' performance was not affected by this cueing strategy in general, older adults' performance was enhanced when they used dyadic common ground. The previous section ruled out the possibility that the age-differential effect of dyadic common ground could be understood by considering participants' Digit–Symbol score as an indicator of participants' cognitive-mechanic skills. The follow-up analyses presented in the current section considered how the difficulty of the targets may have interacted with participants' age in producing the reported age-differential effect of dyadic common ground. *Target difficulty* was estimated by the mean number of words needed across all participants to explain a specific target word (i.e., across both younger and older adults, and across both experimental conditions). As difficult targets were those with required longer explanations across the whole sample, I interpreted this measure as a reflection of a more elaborated, comprehensive explanation that a

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[57] Predicting the number of words needed (log-transformed distribution). Additional predictors: *dyadic common ground* ($\beta = -.02$, $t = -1.25$ [1702], *n.s.*), *explaining partners' Digit–Symbol score* ($\beta = -.01$, $t = -2.34$ [150], $p < .05$), *order of conditions* ($\beta = .06$, $t = 1.63$, [66.8], *n.s.*), *use of forbidden words* ($\beta = -.31$, $t = -2.94$ [1685], $p < .05$).

target required in general. This task-centered approach addresses the main difficulty of the task in the total sample, irrespective of a participant's general performance when working with the spouse. Table 3.7 provides an overview of how target difficulty altered the effect of *dyadic common ground* depending on participants' *age group*. It shows the parameter estimates for the effect of *dyadic common-ground use* by age group and separately for the total sample of targets, easier targets only, and more difficult targets only. For each of these samples of targets, it also shows the estimates for the interaction effect of *dyadic common-ground use* with participants' *age group*.

Table 3.7
Age-Differential Effect of Dyadic Common Ground Depending on Target Difficulty

	Parameter estimates		
	β	t	*df*
Total sample of targets (N = 1763 trials)			
Main effect of *dyadic common ground*	-.02	-1.21	1698
Main effect for younger adults	.02	0.66	864
Main effect for older adults	-.06 *	-2.32	853
Interaction effect of *Dyadic Common Ground* x *Age Group*	-.07 *	-2.05	1718
Easy targets only (N = 883 trials)			
Main effect of *dyadic common ground*	.09 *	4.28	832
Main effect for younger adults	.12 *	4.53	432
Main effect for older adults	.04	1.51	415
Interaction effect of *Dyadic Common Ground* x *Age Group*	-.08 *	-1.99	852
Difficult targets only (N = 880 trials)			
Main effect of *dyadic common ground*	-.09 *	-3.42	808
Main effect for younger adults	-.07 *	-2.12	405
Main effect for older adults	-.11 *	-2.66	419
Interaction *Dyadic Common Ground* x *Age Group*	-.04	-0.68	829

* p < .05. Unequal *n*s are due to invalid trials.

In more difficult targets, both younger and older couples' performance was enhanced by using dyadic common ground,[58] and this effect was independent of participants' *age group*

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[58] Estimate for younger age group (predicting the number of words needed, log-transformed distribution): *dyadic common ground* (β = -.07, t = -2.12 [405], *p* < .05). Additional predictors: *order of conditions* (β = .06, t = 1.10 [36.1], *n.s.*), *use of forbidden words* (β = -.33, t = -1.34 [412], *n.s.*). Estimate for older age group: *dyadic common ground* (β = -.11, t = -2.66 [419], *p* < .05). Additional predictors: *order of conditions* (β = .07, t = 1.54 [37.9], *n.s.*), *use of forbidden words* (β = -.52, t = -2.31 [423], *p* < .05).

(βAge Group x Dyadic Common Ground $= -.04$, $t = -.68$ [829], *n.s.*).[59] An illustration of these results can be seen in Figure 3.8. In easier targets, older adults' performance was neither significantly enhanced nor deteriorated by the use of dyadic common ground (βdyadic common ground $= .04$, $t = 1.51$ [415], *n.s.*).[60]
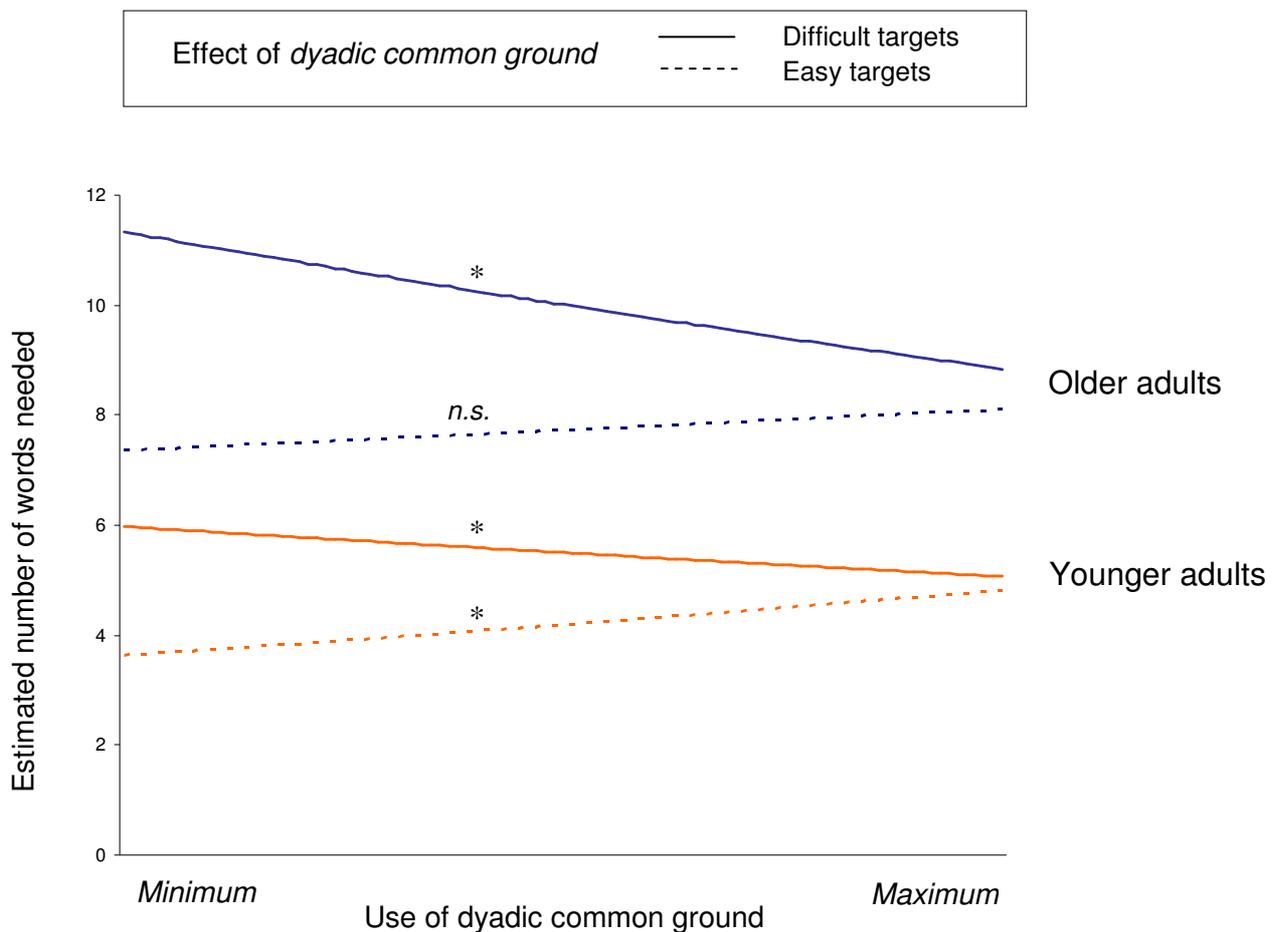
Figure 3.7. Estimated effect of using dyadic common ground in easier and more difficult target words (median split), separately for younger and older adults. Estimates were obtained from MLM using the log-transformed distribution of the dependent variable. They are shown in the real metric of the dependent variable (words needed). Number of observations used: Older adults, difficult targets: $n = 480$ trials; older adults, easy targets: $n = 456$ trials; young adults, difficult targets: $n = 456$ trials, younger adults, easy targets: $n = 480$ trials. * $p < .05$. *n.s.* not significant. Unequal *n*s are due to invalid trials.

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[59] Predicting the number of words needed (log-transformed distribution). Additional predictors: *dyadic common ground* ($\beta = -.07$, $t = -1.99$ [810], *p < .05)*, *age group* ($\beta = .28$, $t = 8.04$ [77.7], *p < .05)*, *order of conditions* ($\beta = .06$, $t = .85$ [75.1], *n.s.*), *use of forbidden words* ($\beta = -.45$, $t = -2.72$ [840], *p < .05)*.

[60] Predicting the number of words needed (log-transformed distribution). Additional predictors: *dyadic common ground* ($\beta = .04$, $t = 1.51$ [415], *n.s.*), *order of conditions* ($\beta = .03$, $t = .73$ [36.9], *n.s.*), *use of forbidden words* ($\beta = -.45$, $t = -2.90$ [418], *p < .05)*.

In contrast, younger couples' performance in easier targets was worsened according to the degree to which the explaining partner referred to dyadic common ground ($\beta_{dyadic\ common\ ground}$ = .12, t = 4.53 [432], $p < .05$).[61] A significant interaction effect of *age group* and *dyadic common-ground use* when predicting spouses' performance in the subsample of easier targets ($\beta_{Age\ Group\ x\ Dyadic\ Common\ Ground}$ = -.08, t = -1.99 [852], $p < .05$)[62] indicated that the detrimental effect for performance as predicted by the use of *dyadic common ground* in easier targets was actually unique to the younger age group (see Figure 3.7).

3.2.5 Did the Number of Taken Guesses Contribute to the Effect of Dyadic Common Ground?

One may argue that dyadic common ground predicts better performance in older adults only because idiosyncratic cues touch more personal and salient issues as compared to common-knowledge cues. This, in turn may cause the guessing partner to respond to them more vividly and produce guesses. As these guesses might provide the explaining partner with feedback on how the previous cues were understood, this may enable him or her to adjust the subsequent cues to this information. To investigate this possibility, a model was developed that included the number of guesses taken in a given trial as the criterion (see Appendix, section 6.4, for the development of this model) and dyadic common ground as a predictor. Results indicated that dyadic common ground did not elicit more guesses from the partner, but contrary to this, the more dyadic common ground was used in a trial, the fewer guesses were taken by the partner ($\beta_{dyadic\ common\ ground}$ = -.42, t = -4.60 [1739], $p < .05$).[63] More importantly, I repeated all analyses reported in section 3.2 while controlling for the *interactive nature* of a trial. This trial-wise measure was built by the number of guesses taken, divided by the number of cues used for a certain target, and taken as an indicator of the relative amount of feedback provided by the guessing partner in

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[61] Predicting the number of words needed (log-transformed distribution). Additional predictors: *dyadic common ground* (β = .12, t = 4.53 [432], $p < .05$), *order of conditions* (β = .09, t = 1.99 [35.8], p = .05), *use of forbidden words* (β = .07, t = .29 [425], *n.s.*).

[62] Predicting the number of words needed (log-transformed distribution). Additional predictors: *dyadic common ground* (β = .12, t = 4.49 [859], $p < .05$), *age group* (β = .25, t = 8.35 [76.4], $p < .05$), *order of conditions* (β = .06, t = 1.99 [74.6], p = .05), *use of forbidden words* (β = -.31, t = -2.40 [847], $p < .05$).

[63] The model predicted the number of wrong guesses taken until the target word was guessed correctly. Additional predictors: *order of conditions* (β = .15, t = 1.03 [74.7], *n.s.*), *use of forbidden words* (β = -.81, t = -1.36 [1732], *n.s.*). It should be noted that the assumption of normality was violated for the measure of wrong guesses taken. As outlined in Part 2, wrong guesses were relatively rare in the present sample, and the measure displayed severe kurtosis and positive skewness (cf. Appendix, Table A5). The distribution could not be ameliorated by transformations. The single result from the analysis using the number of guesses as the dependent variable should therefore be interpreted with caution. Insights provided by the additional analyses using the *interactive nature* of a trial as a control variable on the predictor side can be considered more reliable.

a given trial. Repeating the analyses while controlling for the *interactive nature* of a trial did not change any of the results reported in section 3.2.

3.2.6 Interim Summary: The Use of Dyadic Common Ground and its Effect on Performance

In section 3.2, I reported analyses and results to address the research question that asked about age-differential benefits from using dyadic common ground for familiar partners' collaborative performance. Results supported the assumed effects of the experimental manipulations on the use of this strategy. Both younger and older adults explained more targets referring to dyadic common ground when cueing their spouses than when cueing an unfamiliar person. In target words related to the couples' everyday lives, spouses used dyadic common ground more often than in targets with lower everyday-life reference. Moreover, the quasi-experimental manipulation of participants' age group was associated with the frequency with which dyadic common ground was used: Older participants used this cueing strategy in more targets than younger adults.

Subsequently, I reported analyses investigating the hypothesized effects of the use of dyadic common ground on spouses' performance. Hypothesis 2.1 predicted that using dyadic common ground would enhance both younger and older couples' performance in that it would reduce the number of words required to cue the partner. The data supported this hypothesis for the older couples only: The more dyadic common ground older participants used when cueing their spouse, the fewer words they needed to elicit the correct response. A corresponding effect was not observed in the younger subsample. The interaction effect of *dyadic common ground* with participants' *age group* and was significant, providing support for Hypothesis 2.2, in which I assumed an age-differential effect of the use of dyadic common ground.

Follow-up analyses on the effect of dyadic common ground addressed the role of participants' cognitive-mechanic skills as indicated by their Digit–Symbol score, and the difficulty of the target words. Results indicated that the age-specific effect of dyadic common ground on performance was robust to controlling for performance in the Digit–Symbol Substitution Test. Additional follow-up analyses showed that in more difficult targets, both younger and older spouses' performance profited from the use of dyadic common ground. In easier targets, using dyadic common ground did not affect older spouses' performance, but younger spouses' performance deteriorated along with the use of this cueing strategy.

3.3   Summary of Hypotheses and Central Results

To summarize, performance in the experimental task was investigated with respect to two major factors: partners' familiarity (working with the spouse vs. working with an unfamiliar partner), and the use of dyadic common ground as a cueing strategy among spouses.

In line with Hypothesis 1.1, there was empirical evidence that both younger and older adults' performance was better when cueing their spouses than when cueing an unfamiliar partner, meaning that fewer words were needed to elicit the correct response in the spouse than in the unfamiliar partner. No direct evidence was found for Hypothesis 1.2, in which I predicted that the effect of partners' familiarity on performance would be greater in older, as compared to younger adults: Contrary to this assumption, younger and older adults profited to a comparable degree from working with their spouses. Follow-up analyses showed that rather than participants' chronological age, age-related cognitive-mechanic skills predicted the scope of the familiarity effect. With respect to the effect of dyadic common ground on spouses' performance, I hypothesized that this cueing strategy would generally enhance spouses' performance in that the use of dyadic common ground would reduce the number of words needed to cue their spouse (Hypothesis 2.1). This hypothesis was empirically supported for the older, but not for the younger subsample of participants. The interaction effect of dyadic common ground with is participants' age group was significant. This provided evidence for Hypothesis 2.2, in which I predicted that older adults would profit more from using dyadic common ground than younger adults. Table 3.8 summarizes the central results.

Table 3.8
Overview of Hypotheses and Empirical Support as Provided by the Present Study

Hypothesis		Empirically supported?
1.1	Both younger and older adults will need fewer words to cue their spouses than to cue an unfamiliar partner.	*Yes*
1.2	The beneficial effect of partners' familiarity on collaborative performance will be stronger for pairs of older adults than for pairs of younger adults.	*No, but follow-up analyses investigating the moderating effect of cognitive mechanics provide indirect supportive evidence.*
2.1	The more dyadic common ground is used among spouses, the fewer words will be needed to successfully cue the spouse, both in younger and in older adults.	*No, for younger adults* *Yes, for older adults*
2.2	Using dyadic common ground will reduce the number of required words to successfully cue the spouse to a greater extent in older than in younger couples.	*Yes*

4. DISCUSSION

The goal of the present study was to investigate the adaptive potential of collaborative cognition in early and late adulthood. To this end, it integrated propositions from research on interpersonal collaboration into a lifespan-theoretical framework. From this perspective, the question of how individual functioning can be maintained in the face of developmental constraints and aging-related losses poses a central research interest (cf. Dixon, 1999). As proposed by P. B. Baltes and colleagues (2006), development unfolds within biological, social, cultural, and historical contexts and is characterized by gains and losses in any phase of life. According to propositions of SOC Theory (P. B. Baltes & Baltes, 1990; cf. Riediger et al., 2006), developmental losses in a given domain of functioning may be compensated for through multiple means. Biologically-based processes of decline in late adulthood render the individual with a less favorable ratio of developmental gains and losses – for example, in the domain of mechanic-cognitive functioning. This fosters the importance of compensatory regulation processes for maintaining everyday competencies in old age.

The present research focused on one particular means of compensation, namely collaborating with another person. Collaboration may support cognitive functioning where it becomes particularly fragile in old age, for example, in the domain of memory functioning (Dixon et al., 2007; Johansson et al., 2005). However, collaborating with another person does not only imply gains. It is also resource-demanding in itself, which may particularly affect older adults' cognitive systems (cf. Craik, 2000; Gould, 2004; Johansson et al., 2000). Therefore, the general endeavor of the present investigation was to identify conditions under which older adults could optimally take advantage of interpersonal collaboration.

Collaborative cognition may be facilitated if the interaction partners are familiar with each other, as proposed by research on the familiarity effect in collaborative cognition (Andersson, 2001; Andersson & Rönnberg, 1995, 1996, 1997; Dixon & Gould, 1998; Fussell & Krauss, 1989; Goodman & Ofshe, 1968; Hollingshead, 1998a, 1998b, 2000; Wegner et al., 1991). Familiar partners have been found to outperform unfamiliar individuals in a number of collaborative cognitive tasks, which has been explained by the interactive expertise that people develop through repeated interactive experiences (Dixon, 1999). Interactive expertise should save cognitive resources, as it allows the partners to predict and interpret each other's actions and utterances with less cognitive effort as compared to unfamiliar interaction partners. As has been

repeatedly proposed in the literature (cf. Amizita, 1996; Dixon, 1999, 2000; Johansson et al., 2005), this advantage might particularly favor the collaborative performance among older adults, who operate under less favorable resource conditions than younger adults.

The present study furthermore investigated intimate couples' use of dyadic common ground (i.e., the stock of knowledge that two partners share from idiosyncratic past experiences) as a knowledge-related facet of interactive expertise. Shared idiosyncratic knowledge allows for both effective and efficient communication, and it is easy to process. Using dyadic common ground with a familiar partner in an interpersonal task might be especially fitting for the specific demands of cognitive functioning in late adulthood.

In sum, both the aspect of general interactive expertise and the specific facet of dyadic common ground may particularly support older adults' collaborative performance. However, empirical research on these suggestions is scarce and has yielded divergent evidence. The present study was conducted to address these theoretical propositions empirically. It investigated possible age-differential benefits on collaborative performance that may be gained through (a) the interactive expertise with a familiar partner in general and (b) the use of dyadic common ground with a familiar partner in particular.

The empirical study investigated younger (20–33 years, $n = 76$) and older (63–79 years, $n = 80$) adults' performance in a collaborative experimental setting. The approach combined the simulation of an everyday-life situation (communicating a piece of information to an interlocutor) with the possibility to experimentally vary the task in a controlled setting. Participants were asked to explain target words (a) to their spouses and (b) to an unfamiliar interaction partner, using as few cue words as possible. The task of the listening partner was to guess the target. The central outcome variable of interest was the number of words that participants needed before the partner produced the correct response. The within-person variation of experimental conditions allowed for an age-comparative analysis of the potential benefits of partners' familiarity for performance. It was hypothesized that both younger and older adults would require fewer words to cue their spouses than to cue an unfamiliar partner, and that this familiarity effect would be more pronounced in older than in younger adults. Likewise, it was assumed that using dyadic common ground with their spouses would allow both younger and older adults to reduce the number of words they required to let their partner guess the target. It was furthermore hypothesized that the effect of using dyadic common ground would be greater in older than in younger couples. As predicted, results revealed that couples outperformed unfamiliar dyads. However, contrary to the expected age-differential pattern, this familiarity effect did not differ between younger and older adults. Within the sample of spouses, the analyses did not support the hypothesized general effect

of dyadic common ground on spouses' verbal efficiency. However, in line with the assumed age-differential effect of dyadic common ground on performance, only older couples' performance profited from this cueing strategy, whereas younger adults' performance did not.

In the following, these results will be evaluated with respect to prior research on related topics (sections 4.1–4.4), and revisited in light of propositions of the SOC Theory (section 4.5). Subsequently, I will elaborate on limitations of the present study (4.6) and suggest directions for future research (4.7). The discussion will close with an overall evaluation of the present work (4.8).

4.1   Age Differences in Collaborative Performance

A basic prediction about participants' performance in the experimental task was that younger adults would display a better performance than older adults. In line with this basic prediction, younger adults clearly outperformed older adults in the Taboo task. As expected, this age difference pertained to both experimental conditions: Both when cueing their spouses, and when cueing an unfamiliar person, younger adults needed fewer words to complete the task than older adults. Several factors associated with participants' age might have contributed to this result. Some of these underlying factors will be discussed in the following. For this, I will revisit various affordances of the experimental task as they were outlined in part 1 and elaborate on possible age differences for each of the identified components as suggested by the literature. The expected age differences in performance (and possible causes for this finding) will be considered in detail in the following because they set the stage for the investigation of possible moderating factors. These will be discussed in the subsequent sections (4.2. and 4.3).

Linguistic affordances of the task. Task performance in the present study depended on participants' ability to produce *efficient* statements. It may be that aging-related decrements in this ability, which have been demonstrated by various studies, contributed to the overall age differences in performance in the present study. For example, older adults use less coherent speech than younger adults (Ulatowska, Hayashi, Cannito, & Fleming, 1986) and produce more referential errors and lexical ambiguity when describing pictures or scenes (Pratt, Boyes, Robins, & Manchester, 1989). They also engage more in off-target verbosity (i.e., complex speech with lacking focus; Gold et al., 1988; Pushkar et al., 2000), which has been discussed with reference to the well-documented changes in inhibitory functions as people age (Dempster, 1992; Hasher et al., 1999). Finally, the observed age differences in verbal efficiency might also be due to older adults' stronger motive to talk in well-formed, elaborated sentences (cf. Gould & Dixon, 1993; Hupet et al., 1993; Ryan, Hutchinson, & Hull, 1980). This motive might have interfered with the

attempt to be verbally efficient. While these features of older adults' communication style may not imply a general deficit in everyday life (Gould & Dixon, 1993; Shewan & Henderon, 1988), they may have counteracted older adults' attempt to produce efficient statements in the experimental setting.

More sophisticated skills: Inferring the partner's state of knowledge about a given subject. On a more sophisticated level, the communication task required to infer the partner's state of knowledge about the target. Research on perspective taking and Theory of Mind suggests that these complex mental representations and operations become more resource-demanding as people age (e.g., Inagaki et al., 2002; Kemper et al., 1996; Ligneau-Hervé & Mullet, 2005; McKinnon & Moscovitch, 2007; Slessor et al., 2007; Sullivan & Ruffman, 2004). As has been outlined in part 1, the according aging-related impairments should be magnified if collaborating partners are unfamiliar and need to infer each others' state of knowledge. In contrast, these losses may not be as detrimental for collaborative performance if the interlocutors are familiar with each other and their knowledge overlaps to a sufficient degree. If familiar partners refer to their personal, idiosyncratic knowledge, the listening partner is likely to be able to relate to this, even when his or her personal perspective has not been considered (e.g., Wu & Keysar, 2007). The pattern of results in the older subsample is in line with this assumption: Older adults' performance profited uniquely from using dyadic common ground with their spouses.

4.2 Effect of Partners' Familiarity on Collaborative Performance

The following sections will address the effect of the experimental manipulations, and interactions of those factors with participants' age, when predicting performance. In section 4.2.1, I will discuss the general effect of partners' familiarity in the total sample. In section 4.2.2, I will turn to inter-individual differences in this effect.

4.2.1 General Familiarity Effect in the Total Sample

As expected, spouses generally outperformed unfamiliar dyads in the experimental task. This hypothesized result corresponds to previous research that compared familiar and unfamiliar dyads in a variety of interactive tasks, and across varying types of familiar dyads. More specifically, this result is in line with findings from the literature on interpersonal cueing and interactive expertise (Andersson & Rönnberg, 1997; Fussell & Krauss, 1989; Goodman & Ofshe, 1968). Quite consistently, these studies report a beneficial effect of partners' familiarity on collaborative performance (i.e., a benefit from working with a familiar partner as opposed to

working with an unfamiliar partner). The familiarity effect in collaborative cognition has been explained by the interactive expertise that familiar partners have built through repeated interactive practice (Dixon, 1999). This construct encompasses various experience-based competencies, among others, expertise in interactive timing with a particular partner (Field et al., 1992), an enhanced ability to read a particular partner's facial expressions and gestures (e.g., Hollingshead, 1998a; Mazur, 2004), and knowledge about the partners' stock of knowledge (e.g., Wegner, 1986; Wegner et al., 1991). Apart from these factors, which are primarily associated with perceptual stimuli and their cognitive processing, socio-emotional aspects might have contributed to the general difference between spouses and unfamiliar partners, as suggested in the literature on habitual routines in task-performing groups (Gersick & Hackman, 1990). In the experimental setting, participants might have felt more secure with their spouses than with an unfamiliar person and might therefore have been better able to concentrate on the task. It is possible that unfamiliar partners invested more effort into establishing a supportive, comfortable working atmosphere (cf. Gould, Kurzman, & Dixon, 1994).[64]

In the second hypothesis on the familiarity effect, I suggested that it would be more pronounced in older than in younger adults (Hypothesis 1.2). This hypothesis was not supported by the data: Partners' familiarity enhanced younger and older adults' performance to a comparable degree. However, there was indirect evidence for the suggested age-differential benefit from working with a familiar partner. Follow-up analyses showed that participants' Digit–Symbol performance, a marker of aging-related decline, moderated the familiarity effect (see next section). This suggests that not chronological age in itself, but rather aging-related cognitive skills predict how much people profit from being familiar with an interaction partner.

Prior empirical work suggests that the main effect of interactive expertise when predicting collaborative performance is highly task-specific (see Dixon, 1999; Gould et al., 2002). More importantly, the hypothesized interaction effect of interactive expertise with participants' age might be particularly sensitive to variations of the experimental paradigm. Older adults might not be as flexible as younger adults if the context of an interactive situation differs from their everyday-life experiences. It is possible that the hypothesized stronger effect of partners' familiarity on older adults' performance is supported in alternative experimental tasks if

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[64] Self-report measures obtained from the participants after each session, however, did not support this interpretation. Participants reported enjoying the task to the same degree, and being as relaxed, when completing it with their spouses and when working with the unfamiliar partner. It is possible that participants' emotional arousal was indeed different in the two experimental conditions, but that this difference was not reflected by their self reports. Participants might have lacked the awareness of a greater emotional tension when playing with an unfamiliar person, or they might have noticed a difference but did not report it because of social desirability (i.e., the tendency to describe oneself in a favorable and socially accepted way, cf. Wilson, 2002).

differences between everyday-life situations and the experimental situation are further reduced. Optimally, those tasks should maximize older adults' opportunities to rely on their crystallized skills and pragmatic knowledge, while reducing the dependence on cognitive-mechanic factors. Given that younger and older adults may respond differentially to a lack of ecological validity in laboratory settings, this could be a particular ambitious endeavor for future studies. I will elaborate on this point in more detail in section 4.7, where I will describe possible routes for future research.

4.2.2 Inter-Individual Differences in the Familiarity Effect

As discussed above, the main analyses supported the hypothesis of a general effect of partners' familiarity on performance, but did not support an interaction effect of partners' familiarity and participants' age. In the following, I will summarize and discuss the findings obtained from follow-up analyses on the role of partners' familiarity for their performance. These additional analyses were performed to identify factors underlying more complex interaction effects of partners' familiarity with participants' age group on task performance.

In section 4.2.2.1, I will address the interaction effect of partners' familiarity with participants' cognitive-mechanic abilities, as reflected by their Digit–Symbol scores. In the subsequent sections, I will discuss the age-differential interaction of the familiarity effect with variables that are related to participants' life conduct, which may reflect the amount of couples' interactive expertise. Those variables pertain to participants' social network (section 4.2.2.2) and couples' relationship duration (section 4.2.2.3).

4.2.2.1 Cognitive-Mechanic Skills

Typically, collaborative-cognition tasks depend on each individual's cognitive-mechanic skills, as many paradigms include the learning of new material or a strategy. Likewise, the chosen experimental task in the present study did indeed challenge the participants' cognitive-mechanic skills because each target word had to be approached with a creative strategy of how to explain it to the partner. However, the paradigm allowed the participants to fall back on their pragmatic skills as well – that is, on the interactive expertise that they had built with their spouses over the years. In line with propositions of the SOC Theory (P. B. Baltes & Baltes, 1990; cf. Riediger et al., 2006), older adults' limits of maximum performance in a cognitively challenging task can be extended if they are given the opportunity to use such pragmatic skills. Results of the follow-up analyses supported this association for the *total* sample of participants, including the younger

participants: The lower participants' cognitive-mechanic skills were, the more they profited from working with their spouse (as opposed to working with an unfamiliar partner). This result implies that intellectual abilities as reflected by participants' Digit–Symbol scores were more predictive of the performance with an unfamiliar person, as compared to interactions with the respective spouse. Collaboration among spouses therefore seems to have the potential to compensate for individual deficiencies in cognitive-mechanical abilities.

Persons who belonged to the lower three quartiles of the Digit–Symbol distribution performed better when cueing their spouses than when cueing an unfamiliar partner. This group comprised only about half of the younger participants of the total sample, but almost all older participants. Accordingly, it is possible that in the normal population, collaborative benefits from interactive expertise may generally be more frequently observed in older adults than in younger adults. Interestingly, younger adults with higher cognitive-mechanic skills did not profit from working with their spouses; their performance was not reliably different in both experimental conditions – and in both conditions, it was superior to the other participants' performance. This may indicate that the advantages offered by the interaction with the spouse were not necessary for this special group of younger persons to master the task.

It should be noted that although those persons with lower cognitive-mechanic skills improved their collaborative performance when working with their spouse (as compared to working with an unfamiliar partner), they still did not reach the level of performance displayed by persons with relatively high cognitive-mechanic skills. This finding is in line with previous research showing that various means of compensation may reduce individual differences in performance, but usually do not eliminate them entirely (e.g., Craik et al., 1987; Lindenberger, Kliegl, & Baltes, 1992). Therefore, a person's benefit from interactive expertise needs to be evaluated in the context of his or her individual level of performance, and should not be expected to make up entirely for inter-individual differences.

Apart from participants' intellectual abilities, two further variables were examined as potential moderators of the effect of partners' familiarity on performance. These two variables, namely participants' *social network* outside their partnerships, and couples' *relationship duration*, were considered as possible building blocks of spouses' interactive expertise, as these measures may indicate the amount of interactive practice that couples could build on in the experimental situation. In the next section, I will discuss the role of participants' social-network size for their performance in the experimental task. In section 4.2.2.3, I will then turn to the role of couples' relationship duration.

4.2.2.2 Social-Network Size

The hypothesized stronger familiarity effect in older than in younger adults (Hypothesis 1.2) was not supported by the data on the total sample. However, follow-up analyses revealed an age-differential familiarity effect within the subsample of participants who reported a smaller social network outside their partnerships. Only among those participants who reported a smaller social network, did older participants profit more than younger adults from working with their spouses. As in-depth follow-up analyses revealed, neither younger nor older adults' performance with the *unfamiliar partner* was related to the size of their social network. Rather, participants' social-network size was associated in an age-differential way with how well the *couples* performed in the experimental task. This result seems surprising at first, but can be understood on the basis of research on couples' social life and relationship development. In the following, I will suggest possible interpretations of this finding. The line of argument will emphasize two age-related differences: First, younger adults generally were in relationships of shorter duration than older adults. Second, they reported having a larger social network than older adults.

Younger adults' social-network size and interactive expertise. Younger adults performed worse with their spouses if they reported having a smaller social network. One age-related difference in the sample pertained to the measure of couples' relationship duration, which was closely associated with participants' chronological age. Couples with a shorter relationship may still be in the phase of building up interactive expertise, as suggested by the follow-up analyses on the role of younger couples' relationship durations for their display of interactive expertise (see next section). This gives rise to the speculation that in earlier phases of a relationship, peoples' social network might catalyze the development of such expertise. It is possible that this process may be facilitated by a larger network, as spouses' social networks typically encompass some persons who are important to both partners (Kalmijn, 2003; Kim & Stiff, 1991; Milardo, 1982). Due to this overlap, the leisure time shared with other social partners will often also include interactions among spouses. This may imply that in earlier phases of a relationship, the social network offers an important platform for the development of interactive expertise among spouses.

Older adults' social network-size and interactive expertise. However, the results indicated that these lines of argument may only be applied to younger participants and should not be extended to the older participants. If older adults reported having a smaller social network, this was related to a better collaborative performance with their spouses. Overall, older participants reported fewer alternative social partners outside their marriage than younger participants. This finding reflects a typical age-differential pattern that has been discussed as a function of older adults'

increased focus on fewer, but emotionally more meaningful interaction partners, such as the spouse, or close family members (Carstensen et al., 1999; Lang & Carstensen, 1994, 2002). One may speculate that among the older adults, those with a low number of alternative interaction partners might interact more frequently with their spouses while nobody else is present. If on their own, married couples may engage in a highly idiosyncratic interaction style that further refines their interactive expertise. This may not be displayed (and therefore not practiced and refined as often) if other people are frequently present while the partners interact. Older individuals with more extensive social networks might often interact with other persons as well. They may do so individually, but also together with their spouses. In the latter case, the less exclusive setting when among other people may cause couples to engage in a less idiosyncratic interaction style than when they are on their own. Consequently, they may be more used to interacting in a less specialized way with their partners, particularly when in a social surrounding as that posed by the supervised experiment. Drawing on propositions of the SOC Theory (P. B. Baltes & Baltes, 1990; cf. Riediger et al., 2006), the proposed idiosyncratic interaction style among older couples with a smaller social network can be perceived as *selective optimization* of interactive skills. Through repeated interactive practice with their spouses, they may have arrived at an especially refined interaction style with their spouses, resulting in particular benefits from spousal collaboration. In section 4.5, I will revisit this issue when discussing possible advantages and drawbacks of such interpersonal specialization.

Taken together, it seems that a smaller social-network size has different implications for the interactive expertise among younger and older couples. The line of argument taken above suggests that younger adults may still be in the phase of establishing interactive expertise with their spouses. In this phase of a relationship, an extended social network may provide an important context in which interactive expertise can be developed. In contrast, older adults can be assumed to have already developed a certain sophistication in their interactive expertise throughout the years. They generally reported a smaller social network than younger adults, which suggests that they may more often interact exclusively with their spouses and may have developed a particularly refined interactive expertise. These considerations remain speculative at this point and need to be empirically addressed in future studies. The role of couples' relationship durations for their display of interactive expertise will be considered in detail in the following section.

4.2.2.3 Relationship Duration

Younger and older adults' performance was superior among spouses, as compared to unfamiliar partners, that is, spouses required fewer words to cue each other than unfamiliar dyads. Follow-up analyses on the role of couples' relationship duration for this effect revealed that, in the younger subsample, the effect of partners' familiarity when predicting performance was stronger in persons with a longer relationship than in those with a shorter relationship. Theoretical work has suggested that interactive expertise develops over time and through repeated interactive practice (Dixon, 1999; for a general account of the role of repeated practice for the development of expert performance, cf. Charness & Krampe, 2008; Ericson, 2006; Ericsson, Krampe, & Tesch-Römer, 1993). Goodman and Ofshe (1968) reported that married couples outperformed unmarried couples in a verbal-efficiency task. Although the authors did not directly investigate the role of couples' relationship duration, they report that the married couples had generally been engaged in the relationship for a longer period of time than the unmarried couples. The present finding supports the related assumption that interactive expertise may grow more sophisticated as a relationship develops over the years.

The interaction effect of relationship duration and partners' familiarity when predicting performance was not significant for the older subsample. Caution is warranted when interpreting the absence of this interaction effect in older adults, as the variables of chronological age and relationship duration were confounded in this study's sample. In section 4.6, I will elaborate on the implications of this methodological confound.

Interestingly, the effect of working with the spouse (vs. working with an unfamiliar partner) on performance was not only stronger in younger adults with a longer relationship than in those with a shorter relationship; this effect was even stronger than in the older subsample. The particular importance of partners' familiarity for performance in younger adults with a longer relationship seems initially surprising in view of the fact that older adults' relationships had lasted much longer. This yields two conclusions:

First, a crucial phase for the development of interactive expertise may occur in earlier years of a relationship, and further interactive practice over the decades following the initial phases of a relationship may not help to enhance interactive expertise further. The first years of a relationship could therefore be a central phase for processes of interpersonal selective optimization as proposed by the meta-theory of SOC (P. B. Baltes & Baltes, 1990; cf. Riediger et al., 2006). During this time, spouses may start to develop a more specialized interaction style with the spouse, and at the same time, become less flexible when interacting with alternative partners.

This idea is reflected by the twofold performance differences associated with younger couples' relationship duration: With growing relationship duration, they performed better with the spouse, and at the same time, they performed worse with the unfamiliar partner.

Alternatively, it is also possible that younger couples' relationship duration is associated with other meaningful variables that influence the size of the familiarity effect. For example, there may be self-selection processes driven by a greater likelihood for some couples to maintain their relationships over the years, while other couples break up. Variables associated with such life decisions could also moderate the familiarity effect (e.g., personality traits or lifestyle variables). I will revisit this possibility in section 4.6.1.

Second, as the younger couples with a longer relationship profited even *more* than the older subsample from working with the spouse (as opposed to working with an unfamiliar partner), it is possible that indeed more interactive expertise regarding spousal conversation was available to this special subsample of younger, as compared to older adults. Previous research suggests that in particularly long relationships, the frequency of conversations among spouses, and the range of topics covered decrease over the years (e.g., Mares & Fitzpatrick, 2004; Rands & Levinger, 1979; Sillars & Wilmot, 1989).[65] One may speculate that younger participants with a longer relationship might have encountered optimal conditions for performing with their spouses. In contrast to the younger couples with shorter relationships, they might already have acquired substantial interactive expertise over the years. However, they might not yet have entered a phase in their lives in which this expertise was no longer frequently activated.

4.2.3 Partners' Familiarity: Summary and Conclusion for Research Question 1

In Research Question 1, I asked about a greater benefit of knowing one's interaction partner for older than for younger adults. Two major results on the effect of partners' familiarity on performance were reported. First, Hypothesis 1.1 was supported by the results of the present study: Couples outperformed unfamiliar dyads in the experimental task. This finding is in line with prior research on the effect of interactive expertise among spouses (e.g., Goodman & Ofshe, 1968; Hollingshead, 1998b; Johansson et al., 2000; Wegner et al., 1991) and provides

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[65] Suggested explanations for this pattern encompass the greater need for younger couples to negotiate daily schedules and long-term goals (Olbrich & Brüderl, 1998) and the motive to establish interpersonal closeness through disclosure in the first years of a relationship (Aron & Aron, 1986; Aron, Aron, Tudor & Nelson, 2004). It should be emphasized that these studies leave the question unanswered whether these effects are due to the length of a relationship, the partners' chronological age, cohort effects, or a joint effect of any of these variables. This limitation is due to the common methodological confound of participants' chronological age and couples' relationship duration, which is also a limitation of the present investigation (see section 4.6.1).

additional converging evidence for the domain of interpersonal communication. The hypothesized age differences in this familiarity effect (Hypothesis 1.2) were not supported by the data: The benefit of working with the spouse (as compared to working with an unfamiliar partner) was not greater in older adults, but comparable to the effect in younger adults. As suggested by follow-up analyses, not participants' chronological age in itself, but age-related cognitive skills moderated the familiarity effect: Lower cognitive-mechanic skills (which are generally lower in the older than in the younger adult population) were associated with a greater benefit from working with the spouse. However, given the substantial inter-individual differences in cognitive changes across adulthood, this association may not be sufficiently captured by the variable of chronological age. Results also indicated that highly skilled young adults performed not reliably better with their spouses than with an unfamiliar partner. This suggests that interactive expertise may actually provide an adaptive potential for compensating for individual constraints – both in younger and in older adults. Further follow-up analyses showed that the familiarity effect was moderated in an age-differential way by the amount of interactive practice among spouses. Participants' social network outside the partnership and couples' relationship duration were considered as indicators of the amount of couples' interactive practice. These analyses indicated that the familiarity effect was amplified in younger participants with a longer relationship. Furthermore, among those participants who reported a smaller social network outside their partnerships, older adults profited more than younger adults from working with their spouses. One may speculate that in earlier phases of a relationship, the social network offers a context in which interactive expertise is established. In contrast, interactive expertise in longer partnerships may become even further refined if the partners' interactions often take place in the absence of other persons.

4.3 Use of Dyadic Common Ground and its Effect on Spouses' Collaborative Performance

The previous sections subsumed under section 4.2 addressed the role of partners' familiarity for performance. In the following sections, I will discuss the specific interpersonal cueing strategy of using dyadic common ground in spouses' interpersonal cueing. For these sections, I will differentiate between the *use* of dyadic common ground (section 4.3.1), and the *benefits* for performance associated with the use of dyadic common ground (section 4.3.2).

4.3.1 Frequency of Dyadic Common-Ground Cues: Factors of Influence

The present study design included three experimental factors: participants' age group, and two experimental manipulations that were included to increase the variance in participants' tendency to spontaneously refer to dyadic common ground in their cueing. Those were the interaction partners' familiarity (implemented by a within-person variation of the interaction partner), and the degree to which the target word offered references to the participants' everyday lives (implemented by a within-person variation of features of the target words). In the following, I will summarize and discuss findings on how these three design factors altered the frequency of dyadic common-ground use.

Spouses Used Dyadic Common Ground More Often Than Unfamiliar Partners

The use of dyadic common ground was observed rather frequently in both younger and older couples, but it hardly occurred among unfamiliar partners. Two aspects of this finding seem worth noting.

First, spouses used this cueing strategy *spontaneously* when trying to communicate an idea to the partner. This suggests that referring to dyadic common ground is a strategy with a low threshold among familiar partners, and that it might also occur in spouses' natural communication in everyday life. However, the experimental paradigm was developed to elicit the use of dyadic common ground among familiar partners. The task required avoiding a given list of forbidden cue words, and this might have particularly encouraged participants to use idiosyncratic information in their cueing. Therefore, the frequency of this strategy as observed in the experimental setting might be higher than its frequency in everyday life. Future research is needed to empirically clarify this speculation.

The second aspect of interest in the present section pertains to unfamiliar partners' use of dyadic common ground. This occurred much less often than among spouses. Still, it seems worth noting that this cueing strategy was used *at all* among unfamiliar partners, given the very restricted stock of shared idiosyncratic knowledge that unfamiliar interaction partners could build on. They had never met each other before and could only use idiosyncratic knowledge that they (a) expected to share with the interaction partner by chance or (b) had built in the short time of the experimental situation. This means that even in a situation in which it was rather difficult to identify and use shared knowledge, participants occasionally tried to do so. This may indicate that this strategy was considered particularly helpful by the participants. Otherwise, dyadic common

ground may have been used for reasons beyond the enhancement of verbal efficiency, for example, to make the social interaction more personal, comfortable, or interesting.

Everyday-Life Targets Elicited the Use of Dyadic Common Ground in Spouses

The second experimental manipulation, namely, the variation of the everyday-life reference of the target words was implemented to increase the variance in the use of this cueing strategy among spouses. Analyses showed that this manipulation led to the desired effect. As expected, participants were more likely to refer to dyadic common ground if the respective target word at hand had been rated high in everyday-life reference in the independent word-rating pre-study. This suggests that the stock of shared knowledge that is used in spousal conversations is to a large extent retrieved from memories of joint everyday-life experiences. This association was not deterministic, meaning that participants did sometimes use idiosyncratic cues for more exotic targets. However, this was only possible if a person happened to remember a personal experience related to the target. For more exotic targets, it was either less likely that participants had sampled any experiences related to the target, or that those experiences, if there were any, were not as easily retrieved from the explaining partners' memory.

Older Adults Used Dyadic Common Ground More Often Than Younger Adults

Older adults used dyadic common ground more often than younger adults when cueing the spouse. In the following, I will elaborate on two possible implications of this finding. First, I will discuss what may, and may not, be derived from this finding with respect to adult-age trajectories in the abilities to use dyadic common ground. After this, I will discuss possible mechanisms that might have caused older adults to use dyadic common ground more often than younger adults.

Implications for older adults' abilities to use dyadic common ground. Older adults used dyadic common ground more frequently than younger adults. Moreover, the use of this cueing strategy did not depend on participants' cognitive-mechanic skills as captured by the Digit–Symbol Substitution Test (Wechsler, 1955). This suggests that, despite aging-related declines in various cognitive functions, it might not have been particularly difficult for older adults to produce idiosyncratic information that they assume to share with their partner. It should be reemphasized at this point that the mere utterance of an idiosyncratic piece of knowledge did not indicate that this actually tapped both spouses' knowledge (i.e., their actual *common* ground). It might have occurred that a cue intended to aim at dyadic common ground was not understood by the

partner at all. The external coding of dyadic common ground explicitly ignored the information of the guessing partner's reaction to such cues. The quality of the used dyadic common-ground cues can therefore only be evaluated when considering the effect of this cueing strategy on collaborative performance. Finding an *appropriate* idiosyncratic cue (i.e., taking the perspective of the partner and thinking of a cue that will help the partner best) might be more demanding, and research on age trajectories of abilities involving perspective taking and Theory of Mind suggests that this may impose special processing costs to older adults (e.g., Inagaki et al., 2002; Kemper et al., 1996; Ligneau-Hervé & Mullet, 2005; McKinnon & Moscovitch, 2007; Slessor et al., 2007; Sullivan & Ruffman, 2004). However, as argued in part 1, cueing a partner with dyadic common ground could be comparatively resource-inexpensive because the two partners' knowledge partly overlaps. Due to this overlap, a person may just have to use his or her own, idiosyncratic knowledge (which is comparatively easy to retrieve from memory), and this might easily result in a dyadic common-ground cue that is readable by the partner as well (Wu & Keysar, 2007).

As will be discussed below in more detail (section 4.3.2), the data of this study gives rise to the assumption that older adults not only used dyadic common ground more often, but that their use of this strategy was indeed adaptive. Dyadic common-ground cues seem to have been helpful for older spouses' performance, as indicated by the negative association of dyadic common ground with the number of words required to let the partner guess the correct answer. It is noteworthy that this effect was unique to the older subsample and not observed in the younger couples. This age-differential pattern of results will be addressed in more detail in section 4.3.2.

Possible reasons for the more frequent use of dyadic common ground in older adults. One possible interpretation of older spouses' more frequent use of dyadic common ground (as opposed to younger spouses) is that older adults realized the potential of this cueing strategy for their performance. However, other motives underlying this age difference appear plausible as well. In the following, I will argue that participants, and especially older adults, may have used dyadic common ground for two purposes beyond enhancing cognitive performance. The two suggested motives pertain to (a) reevaluating autobiographical information by reflecting on one's life and (b) enriching and regulating the social situation.

Using dyadic common ground is often associated with explicitly recalling past experiences. Reminiscing on a past event can bring about a new evaluation of the event. This may involve reinterpreting it in a way that is consistent with one's own self-concept, provide a sense of coherence, or enhance satisfaction with one's own life (Pasupathi, 2001). Reflecting on one's life and accomplishing the integration of different pieces of autobiographical information into a

coherent and accepted self-concept is considered an important developmental task in late life (Pasupathi, 2001; Staudinger, 1989). Reminiscing has been proposed to serve emotion-regulatory functions, and there is evidence suggesting that this may particularly apply to older adults. For example, an initially negatively appraised event is evaluated less negatively in retrospect, and this effect seems to be stronger in older than in younger adults (Levine & Bluck, 1997). Therefore, recalling idiosyncratic information may offer benefits for complex intra-individual regulation processes. As compared to younger adults, older adults may thus more often engage in this kind of reminiscing activity and may have developed a generally lower threshold for disclosing autobiographical information. Even in the experimental setting of the Taboo study, interacting with the life partner may have triggered the recall of autobiographical experiences. If the older participants had a lowered threshold for reminiscing, as argued above, this might have elevated the likelihood of dyadic common-ground use when interacting with their spouse – even without implying intentionality or awareness.

Reminiscing has also been observed in interactive contexts, where interaction partners jointly recall past events (Pasupathi, 2001). Most autobiographical memories are built (and conserved) within social contexts. This joint activity has been found to be associated with self-reported low negative and high positive emotional arousal in the interaction partners. In older adults, reported positive emotions were stronger, and reported negative emotions weaker than in younger adults (Pasupathi & Carstensen, 2003). Interestingly, references to one's own personal past have also been reported for unfamiliar interaction partners, and particularly in older adults (Boden & Bielby, 1983; Collins & Gould, 1994). It has been proposed that people, and especially older adults, might actively use mutual reminiscing as a means to enrich the social situation (Boden & Bielby, 1983). In the present investigation, participants may partly have perceived the disclosure of idiosyncratic information as a tool for interpersonal regulation. Dyadic common ground may have been used to make the interaction appear more interesting, comfortable, and emotionally rewarding – both when cueing their spouses, and when cueing an unfamiliar partner.

4.3.2 Age-Differential Effect of Dyadic Common-Ground Cues on Collaborative Performance

In the previous sections, I discussed the results on the *use* of dyadic common-ground cues, more precisely, on the frequency of their occurrence. In the following, I will discuss the findings on the *effect* of this cueing strategy (as indicated by associated changes in the interlocutor's verbal efficiency) if it was used among spouses.

It was assumed in Hypothesis 2.1 that cueing the spouse with dyadic common ground would help both younger and older participants to reduce the number of words they required to elicit the correct response in the partner. Hypothesis 2.1 was partially supported by the data: Only older couples' performance profited from this strategy, meaning that the use of dyadic common ground reduced the number of words older adults needed to cue their spouses. Overall, the beneficial effect of using dyadic common ground on collaborative performance was greater in older than in younger couples, providing support for Hypothesis 2.2. There was no corresponding effect for younger spouses; on average, their performance was not reliably affected by the use of dyadic common ground. Follow-up analyses on moderating factors when predicting performance by the use of dyadic common ground showed that it did indeed affect younger adults' performance, but not generally. As will be discussed in detail in the following sections, this cueing strategy enhanced younger adults' performance in some targets, but worsened their performance in other targets, depending on the difficulty of the target.

Although older adults reduced the number of words needed to cue the spouse by using dyadic common ground, they did not reach the level of performance observed in the younger subsample of spouses. This suggests that using dyadic common ground has a compensatory potential that should be evaluated in relation to a person's individual performance.

Possible reasons for the age-differential effect of dyadic common-ground use on performance. The second research question pertained to possible effects of the role of couples' dyadic common ground on performance. As discussed above, I found no general, but an age-specific benefit from this cueing strategy. Older adults were able to reduce the number of words needed to cue their partners by the use of dyadic common ground. In the following, I will evaluate two lines of follow-up analyses on this age-differential finding. First, I will discuss the robustness of the findings on participants' cognitive-mechanical skills as measured by the Digit–Symbol Substitution Test. Subsequently, I will discuss implications of additional analyses that investigated the role of target difficulty for the effect of dyadic common-ground use in younger and older adults.

Independence of the effect of dyadic common ground from cognitive-mechanic skills. In older couples, the beneficial effect of dyadic common ground on couples' verbal efficiency was robust to controlling for the partners' Digit–Symbol performances (as an indicator of their cognitive-mechanic skills). This suggests that the effectiveness of this cueing strategy did not vitally depend on older adults' cognitive-mechanic abilities as mirrored by their Digit–Symbol performance. It has been outlined before (see section 1.8) that using dyadic common ground may depend on cognitive-mechanic resources to a lesser degree than alternative cueing strategies do. Rather, it

offers the opportunity to fall back on acquired resources and involves the processing of familiar, idiosyncratic information that frees up resources for cognitive-mechanic processing (cf. Craik, 1994; Salthouse, 2000). Following up on this proposition, one could have expected that age-related differences in the effect of dyadic common ground on verbal efficiency would partly be explained by participants' cognitive-mechanic skills. However, this was not the case: Controlling for Digit–Symbol scores did not alter the age-differential effect of dyadic common-ground use on performance. Given that the older subsample was made up of relatively high-functioning older adults (see part 2 and Appendix B), Digit–Symbol performance might not have captured the differences between the age groups that were central for the age-differential finding. Possibly, a more vital age-related difference in this regard pertains to younger and older adults' typical communication styles, as can be understood from the follow-up analyses on target difficulty.

The role of target difficulty for the effect of dyadic common ground. Follow-up analyses including the dimension of target difficulty suggested that the use of dyadic common ground offered benefits for performance both in younger and in older adults, but that the adaptiveness of this strategy depended on the difficulty of the target word in an age-differential way. In easier targets, using dyadic common ground did not help older adults' performance, but it also did no harm. Therefore, when evaluating the overall usefulness of dyadic common ground for older adults' performance, there was still a total benefit for older adults' performance across all tasks investigated in this study. For younger adults, using dyadic common ground actually worsened performance when explaining easier targets. It seems that for younger adults, using dyadic common ground was only advisable to explain a target word involving complex communication. At the same time, it could even be detrimental for younger adults' verbal efficiency if a more frugal, alternative way of cueing would have been available (e.g., describing the visual features of the target). The typical communication patterns observed in the present study generally featured a greater complexity in older than in younger adults (see section 4.1). Therefore, using dyadic common ground lent itself as an adaptive way to improve older participants' rather complex communication style. This enhanced older adults' verbal efficiency when explaining difficult targets. At the same time, older adults' performance was not affected by dyadic common ground in easy targets. Younger adults, however, only profited from dyadic common ground in difficult targets, but this advantage was eliminated by the detrimental effects of this strategy when they explained easy targets.

As reported in part 2, the target words were chosen to vary within the experimental sets and covered different levels of everyday-life reference and frequency in the media. Still, the restricted difficulty range of the targets included in the present study may limit the transfer of the

findings to everyday-life situations. In real life, a broader range of difficulty can be expected for the pieces of information that partners need to communicate to each other. One may speculate that without the necessity of avoiding certain cue words (like in the experimental task), people in their everyday lives will be less likely to use dyadic common ground if they are able to use the most obvious strategies to explain a communication target (e.g., describing its visual features or its classification). Accordingly, one might assume that in everyday life, people will be more likely to use dyadic common ground when facing obstacles, like when communicating a more complex issue, or when the situational affordances of the interaction are difficult (such as a lack of visual information about the partner when talking on the telephone; cf. Doherty-Sneddon, Anderson, O'Malley, Langton, Garrod, & Bruce, 1997). A similar argument has been brought forward by Pickering and Garrod (2004) who propose that explicit common ground might be used more often in conversations when misunderstandings become obvious between partners. Similarly, Keysar, Barr, Balin, and Peak (1998) suggested that common ground is more likely to be considered in a conversation if the partners become aware that their initial representations of an issue largely differ. The results of the present study indicate that dyadic common ground makes younger and older partners' communication more efficient, given that the target of communication requires a longer explanation. As outlined above, one may speculate that in everyday-life conversations, dyadic common ground is more often used when other ways of communicating information fail. In contrast to their behavior in the experimental situation, people in their everyday lives might rarely use dyadic common ground when communicating simple pieces of information. They might rather use it for information that is analogues to the more difficult targets in the study, in which performance profited from using dyadic common ground. Considering this, it may be that the effect of dyadic common ground as it occurs in everyday life was underestimated by the present study, both for younger and older adults.

4.3.3 Dyadic Common Ground: Summary and Conclusion for Research Question 2

Research Question 2 focused on one particular facet of interactive expertise, namely, a possible age-differential benefit from the option to refer to shared idiosyncratic knowledge (dyadic common ground) when working with the spouse. The hypotheses predicted that participants would need fewer words to cue their spouses when referring to dyadic common ground (Hypothesis 2.1), and that this effect would be stronger in older than in younger adults (Hypothesis 2.2). Hypothesis 2.1 was empirically supported only for the older couples. For younger couples, there was no beneficial effect of this special cueing strategy for collaborative

performance. Moreover, Hypothesis 2.2 was supported by the data: Using dyadic common ground enhanced collaborative performance to a significantly greater degree in older than in younger couples. Follow-up analyses on the effect of dyadic common ground on couples' performance revealed that this age-differential pattern of results could not be explained by participants' cognitive-mechanic skills as measured by their Digit–Symbol performance, suggesting that other age-related variables caused this effect, such as older adults' more elaborate style of speech. This idea was further investigated by considering the difficulty of the targets that spouses explained to each other in a given trial. This in-depth investigation of the effect of dyadic common ground on collaborative performance revealed that both in younger and in older adults, dyadic common ground enhanced verbal efficiency if the target required a rather elaborate explanation. In easier targets, this effect was reversed for the younger adults: Here, their performance was worsened by the use of dyadic common ground. In contrast to this, using dyadic common ground in easy targets did not affect older adults' performance in any way. This suggests that for older adults, the benefit obtained from dyadic common ground may hold across a broader variety of difficulty levels in communicative tasks, whereas it is only differentially adaptive for younger adults.

4.4 Synopsis: Benefits of Partners' Familiarity and of Using Dyadic Common Ground for Collaborative Performance

The theoretical framework of this dissertation addressed two research questions that were concretized in two hypotheses each. The first set of hypotheses predicted superior performance in familiar partners (as compared to unfamiliar partners) in the experimental task. It furthermore suggested that the effect of partners' familiarity on performance would be stronger in older than in younger adults. In the second set of hypotheses, dyadic common ground among familiar partners was introduced as a special facet of interactive expertise. It was assumed that using dyadic common ground would enhance performance in both younger and older adults, and that this benefit would be more pronounced in older adults than in younger adults. In sum, similar effects and age-related differences in these effects were assumed for the two factors of interactive expertise and dyadic common ground.

Analyses revealed that the two factors did not exert analogous effects on collaborative cognition. Instead, the benefits for performance associated with interactive expertise (as varied by the factor of partners' familiarity) were similar for younger and older adults. Both age groups performed better when cueing their spouses than when cueing an unfamiliar partner, with no significant age-related differences in this effect. In contrast to this, the effect of dyadic common

ground on performance was age-differential in the present sample. Only older adults' performance was enhanced by the use of this cueing strategy, whereas younger participants' performance did not reliably profit from it.

The pattern of results indicates that the ratio of the effect of dyadic common ground to other benefits of interactive expertise for collaborative performance is likely to differ by age group. This raises the question what distinguishes dyadic common ground from other components of interactive expertise, such as familiar partners' knowledge about the optimal interpersonal coordination of their statements, the correct interpretation of their facial expressions, and the ability to use other non-verbal cues.

In the following, I will discuss two possible explanations for this special effect of dyadic common ground in older couples, as contrasted with the general, age-unspecific effect of interactive expertise (which was observed both in younger and in older adults). These explanations pertain to younger and older adults' typical communication style (see section 4.1) and to older adults' possible tendency to selectively allocate attention to the major demands of the task.

One possible interpretation for the above-mentioned age-differential pattern of results relates to younger and older adults' typical cueing styles. Older adults generally needed more words to cue their partners than younger adults did. This may have been due to adult-age differences in speech production, which have been addressed above (see section 4.1). As suggested by the follow-up analyses on the role of the difficulty of the targets, the beneficial effect of dyadic common ground might have shown up exclusively in longer explanations, which were more common among the older adults. Therefore, older adults' typical communicative style might be sensitive to the effects of using dyadic common ground. This does not imply a general floor effect with respect to dyadic common ground when predicting performance in younger adults, as younger adults were able to improve their performance by using dyadic common ground in some of the targets (those that required more elaborate explanations). This differential finding in younger adults underscores the potential of dyadic common ground as a general compensatory strategy: It may enhance collaborative performance both in younger and in older adults, given that people face a difficult task. However, when considering participants' performance across all targets, older participants' level of performance was more sensitive to the effects of dyadic common ground than younger adults' performance. This may have made this particular cueing strategy more useful for the older adults, whereas for the younger adults, dyadic common ground did not substantially contribute to the effect of interactive expertise.

An alternative explanation of the findings reported above pertains to dyadic common ground as a rather *apparent* facet of interactive expertise. Younger adults profited from interactive expertise in general, but not from the knowledge-related aspect in terms of dyadic common ground. This suggests that younger spouses made use of various alternative facets of interactive expertise (such as their skillfulness in reading the partner's facial expressions or accentuation). Using these more subtle cues might not have been as feasible for older adults while performing a demanding cognitive task. Aging-related changes in cognitive capacity (e.g., Lindenberger, 2000) may particularly limit performance in situations with complex task affordances (cf. Hull et al., 2008; Kray & Lindenberger, 2000; Lindenberger et al., 2000). In the face of the complex task affordances of the Taboo task, older adults might have been more likely than younger adults to selectively invest their resources into selected crucial affordances of the task (cf. for automatic selective resource allocation in the domain of dual-task performance, Huxhold, Li, Schmiedek, & Lindenberger, 2006; for motivational selectivity in the domain of personal goals, Riediger & Freund, 2006). Therefore, older spouses in the present experiment might have responded particularly to explicit verbal references to shared knowledge, and less to subtle cues provided by the partner. As outlined in part 1, the coding in the present study addressed the *explicit* use of dyadic common ground, which might have particularly favored older adults' performance. Additional distinct facets of interactive expertise were not investigated. Therefore, this interpretation remains speculative and needs to be addressed empirically in future research.

In sum, this study provided evidence for (a) an age-independent benefit of interactive expertise for the performance in the investigated cueing task and (b) a particular benefit from using dyadic common ground with the spouse for older couples. This suggests that the knowledge-related aspect of interactive expertise contributed to the familiarity effect of collaborative cognition in older adults' performance, whereas it did not in younger adults. However, the present study only provides a first step towards dissociating the contributions of multiple factors to younger and older couples' interactive expertise. Research would be informed by studying alternative competencies subsumed under interactive expertise. It is also not yet understood how these various facets may differentially contribute to the familiarity effect in people of different age groups. Finally, it should be emphasized that those trajectories could be different depending on the collaborative task.

4.5   Evaluating the Findings in Relation to the SOC Theory

The theoretical framework of this dissertation was embedded in propositions of the SOC Theory (P. B. Baltes & Baltes, 1990; cf. Riediger et al., 2006), which proposes that development can be perceived as the interplay of three universal developmental processes: Selection, optimization, and compensation. In the present work, I investigated collaborative cognition as a means of compensation, and addressed two factors that may help to make such compensation more effective in old age: interactive expertise and dyadic common ground.

As expected, being familiar with the interaction partner helped the study participants to reach a better performance in the experimental task. Presumably, the interpersonal expertise that couples had established prior to the experimental situation made the task easier for them (than for unfamiliar partners) because they had acquired comprehensive knowledge about how interactions work best with each other. Older adults (but not younger adults) also profited from a special facet of this expertise, namely the dyadic common ground established among spouses in their everyday lives.

Both facets – interactive expertise in general, and the specific facet of dyadic common ground among partners – can be applied to tasks carried out with the particular partner and improve performance. However, this benefit is at least partly bound to a particular social constellation. In the following, I will evaluate the general usefulness of these forms of interpersonal specialization from a broader theoretical perspective.

4.5.1   Developmental Gains From Interpersonal Specialization

Interpersonal specialization may be beneficial for many collaborative tasks in everyday life. For example, retrospective and prospective memory can be supported efficiently by the collaboration with social partners (e.g., Dixon et al., 2007; Martin & Wight, 2008). This collaboration may be superior if help is available from a well-familiar partner who is informed about one's state of knowledge and individual intellectual capacities, and with whom interaction is resource-inexpensive. Likewise, ill-structured cognitive tasks involving everyday problem solving or wisdom-related decisions can profit from collaboration (Cheng & Strough, 2004; Staudinger & Baltes, 1996). These tasks may be facilitated by means of interactive expertise and shared knowledge (which is a speculation that, to my knowledge, still needs to be addressed by empirical research). Moreover, these tasks typically relate to rather private problems and life decisions and might therefore particularly offer themselves to collaboration with close social

partners. Therefore, selectively refining the interactive expertise with a limited number of close social partners may offer several advantages for peoples' everyday functioning.

However, development is interpreted as the interplay of gains and losses (P. B. Baltes, 1987, 1990), and interactive expertise is also likely to imply constraints and drawbacks. In the following section, I will address possible disadvantages of interactive expertise.

4.5.2 The Janus-Faced Nature of Interpersonal Specialization

As has been suggested in the theoretical framework of this dissertation (see part 1), interpersonal specialization brings some adaptive potential for individual development with it. It enables familiar partners to succeed in collaborative situations that they share in their daily lives.

However, relying on collaboration with others may also imply disadvantages. If responsibility is distributed among two persons, this can reduce the challenges imposed on the single individuals, who then operate below their individual abilities (Weldon & Bellinger, 1997). Individual skills may therefore not become optimally promoted and maintained. Relying on others may, in the extreme case, lead to subjective dependency on another person (*functional interdependence*, Steiner, 1972), which is not trivial in late adulthood when preserving autonomy is a central developmental challenge (M. M. Baltes & Horgas, 1997). It is conceivable that this dynamic of functional interdependence is aggravated among familiar partners frequently engaging in collaborative activities. The potentially maladaptive nature of interdependency has been illustrated in a study by French, Garr, and Mori (2008) in which collaborating couples were found to be more prone to memory distortion than unfamiliar partners if they discussed a witnessed event. But even without such detrimental influences, relying on another person may be maladaptive if this interpersonal support is not reliably available. Expecting collaboration which is then withheld has been shown to negatively affect individual memory performance, possibly because persons reduce their individual encoding efforts when expecting to be supported in the later recall task (Schaefer & Laing, 2000). Collaboration among close interaction partners may be considered more reliable as compared to more peripheral social partners. However, considering the likelihood of widowhood in old age, relying on the spouse may imply a dependency that potentially leaves the remaining partner unable to cope without the spouse. Perfecting one's expertise in collaborating with one's spouse may therefore come at the cost of becoming too inflexible to perform individually.

In sum, the developmental potential of interactive expertise (and as a special case, of dyadic common ground), on the one hand implies gains because the competencies of interacting

with a particular individual become refined. On the other hand, this specialization may also bring disadvantages in the form of interpersonal interdependency.

4.6   Limitations of the Present Study

Experimental studies offer the opportunity to shed light on a specific, circumscribed phenomenon or process in a special sample, while controlling for as many factors of influence as possible. Building on the awareness of general limitations of controlled experimental settings, I will describe which specific limitations of the present study should be considered. First, I will discuss limitations that are due to the sample composition and the design of the study. Then, I will point to limitations that pertain to the experimental nature of the task and to central measures of the study.

4.6.1   Sample Composition and Design of the Study

The sample of the present study consisted of heterosexual, cohabitating couples from two age groups, namely, younger and older adults. One may speculate that results would be different given alternative sample compositions. In the following, I will consider the specificity of the present sample and study design by highlighting four particular constraints to the generalizability of the results. These aspects pertain to (a) the age groups and the dyadic age-group composition, (b) the interacting dyads' gender composition, (c) various types of relationships, and (d) possible cohort effects and the confounded measures of age and relationship duration.

Age groups and dyadic age-group composition. The present research revealed differences between younger and older adults with respect to their collaborative performance and various moderating factors. A question remaining that cannot be answered by the present study is whether the observed age differences were due to cohort effects, to participants' chronological age, or both, and longitudinal research would be required to address these possible explanations. Furthermore, the study design did not include children, adolescents, middle-aged adults, or very old adults, and no age-heterogeneous dyads were observed in the study. Therefore, the results may neither be transferable to other age groups nor to altered age-group compositions. Results from the present study suggested that interactive expertise grows more sophisticated over the first years of a relationship in younger adults. Accordingly, one may, for example, speculate that middle-aged adults with a longer relationship than younger adults might have access to a more sophisticated level of interactive expertise with their spouse. At the same time, middle-aged adults

might be able to use the interactive expertise with their spouses more flexibly or more efficiently than older adults. For age-heterogeneous dyad compositions, one might assume that collaborative performance can be optimized if partners use their interactive expertise to adjust the division of cognitive labor to the individual competencies. Age-heterogeneous dyads might profit especially from the partners' interactive expertise, but exceptionally sophisticated interactive knowledge may be needed to display these skills. Interactive expertise could, for example, inform familiar interaction partners about how to particularly unburden the more challenged partner, without overstraining the more competent partner of the dyad. In line with the concept of scaffolding (Vygotsky, 1978), this dynamic interactive adjustment could be beneficial both for children who interact with adults, and also for older adults who interact with younger familiar partners (cf. Kessler & Staudinger, 2007).

Gender composition of the dyads. The present study design experimentally varied younger and older interaction partners' familiarity by assigning two different interaction partners to each participant (the spouse, and an unfamiliar person of the opposite sex). It is possible that among familiar same-sex dyads (such as homosexual couples or same-sex friends), results would be different, as gender differences have been reported for various dimensions of interpersonal communication, among them the frequency, the covered topics, and the level of intimacy of the conversations (Aries & Johnson, 1983; Haas & Sherman, 1982; Leaper & Ayres, 2007; Sehulster, 2006). It is conceivable that convergent interests and similar communicative styles among same-sex dyads would lead to a particularly skillful cooperation on verbal tasks.

Types of close relationships. The frequency of interactions, and the level of intimacy, is higher on average among spouses, as compared to other familiar dyads, such as working colleagues, friends, or acquaintances. Therefore, the results of the present study may not apply to alternative dyadic compositions of familiar persons. Age-related differences in younger and older adults' social networks further suggest that the exceptional importance of the spouse is more pronounced in late adulthood than in young adulthood (Carstensen et al., 1999; Lang & Carstensen, 1994, 2002). In older adults, sophisticated spousal interactive expertise might therefore differ from the interactive expertise built with alternative social partners, whereas in younger adults, the interactive expertise with different familiar partners might be more comparable.

Possible cohort effects and confounded measures of age and relationship duration. Many age-comparative studies leave the question unanswered whether observed age-related inter-individual differences in variables of interest are caused by aging processes, differences in cohorts, or other variables associated with chronological age. The same limitation applies to the present study,

which cannot distinguish age-effects from possible cohort effects. The subsamples of younger and older adults were representative for the normal population in the present German cohorts with respect to their reported relationship duration, with younger adults reporting a much shorter relationship than older adults. This representative nature of the sample necessarily implied a methodological confound of participants' chronological age and couples' relationship duration. A completely balanced design, including both younger and older adults with short-term and long-term relationships would have been desirable, but is impossible given that older couples in the present cohort have mostly been married for decades. This confound limits the interpretation of the results related to age differences as well as those related to the couples' relationship duration. Therefore, I will now highlight the central results from analyses on the role of age and relationship duration and elaborate on the implications of the described methodological confound on the interpretation of these results.

First, follow-up analyses suggested that younger couples' benefit from working with the spouse (rather than working with an unfamiliar partner) was higher in younger couples with a longer relationship. Although the data did not support an analogous interaction (of couples' relationship duration and partners' familiarity when predicting performance) in the older subsample, this does not rule out the possibility that comparable trajectories do exist for older adults. One might speculate that older adults with a shorter relationship would have profited less from working with a familiar partner than those with a longer relationship. This remains an open question that could not be addressed with the present sample, which predominantly featured older adults with a longer relationship. Along the same line, the present study also cannot answer the question whether self-selection processes contributed to the findings related to couples' relationship durations. It is conceivable that couples with longer relationships have special characteristics that are associated with their ability and willingness to maintain a long relationship, such as personality traits or variables associated with their lifestyle. The group of couples with a longer relationship may therefore be a rather selected sample, whereas more variance in meaningful variables is associated with shorter relationships.

Second, older couples' performance benefited from using dyadic common ground with the spouse, and this was not observed in the younger subsample. This raises the question whether couples' relationship durations played a role for this age-differential finding. Doubts are warranted with respect to such a speculation as there were no interaction effects of couples' relationship duration with the effect of dyadic common ground when predicting performance – neither in the subsample of younger, nor in the subsample of older adults. However, the range of couples' relationship duration in the present sample only encompassed rather short relationships

(in the younger subsample) and rather long relationships (in the older subsample). It is possible that a crucial phase for the development of dyadic common ground among spouses was not captured by these subsamples, but could lie somewhere in-between these two extreme groups, or in the very early phases of a relationship, such as the first weeks and months.

4.6.2 Experimental Task and Operationalization of Central Constructs

In the following, I will discuss how the experimental setting and the operationalization of the central measures could limit the generalizability of the present findings. First, I will examine how the experimental setting, which was different from participants' real-life interactions, may have biased the way in which partners' familiarity influences younger and older adults' display of interactive expertise in real life. Subsequently, I will emphasize the specific, conservative approach to measuring dyadic common ground that was chosen in the present study, and discuss how additional, more subtle advantages of spouses' shared knowledge may have helped them in the experimental task.

Possible underestimation of the effect of partners' familiarity. A couple's ability to unfold its interactive expertise in a given situation (i.e., the benefit for collaborative performance caused by partners' familiarity) depends on various factors. Follow-up analyses examining the effect of partners' familiarity on performance in the present study suggested that this effect was moderated by participants' cognitive-mechanic skills, their social networks outside the partnership, and by the duration of their partnership. Several other factors might alter the effect of partners' familiarity as well, among them the domain- and task-specificity of the expertise, and, along that line, the match of a couple's expertise with the situational demands at hand. The experimental task in the present study simulated a common everyday-life situation in that it imposed on the participants the task to communicate a piece of information to a listener who was, at first, naïve to the talking person's communication goal. The interactive expertise needed for this task is trained frequently and across various interactive goals and issues in couples' everyday lives. This rather general form of interactive expertise may therefore respond more flexibly to contextual changes, as compared to more specific forms of interactive expertise (e.g., how to coordinate when washing the dishes together). Still, the experimental task differed from the communicative demands that couples face in their everyday lives, for example, in the place, the social context, and possibly, the cognitive and emotional appraisal of the task. Therefore, one might argue that the effect of couples' interactive expertise on collaborative performance might be greater without any contextual deviances from everyday-life interactions.

Moreover, possible contextual effects on the display of couples' interactive expertise may be especially accentuated in *older* adults. Older adults' functioning in everyday life may be particularly supported by domain-specific expertise, which is more sensitive to contextual effects than domain-independent skills (for a review, see Rybash, 1996). Accordingly, it is possible that particularly older adults would profit even more from the interactive expertise with their spouses if the spousal interactions are executed within their natural living environments. This speculation cannot be addressed by the data of the present study and needs further empirical inquiry.

Possible underestimation of the effect of dyadic common ground. The coding guidelines in the present study were developed with the aim (a) to be conceptually unequivocal and (b) to minimize the likelihood that the frequency of dyadic common ground as a cueing strategy among spouses was overestimated. The use of dyadic common ground was therefore coded conservatively, that is, cues were only coded as containing dyadic common ground if the explaining partner *explicitly* mentioned *rather exclusive* idiosyncratic knowledge. One may, however, think of further advantages of shared knowledge representations for spouses' performance. I will now elaborate on two possible additional ways in which spouses' dyadic common ground might have contributed to their performance.

First, the present study focused on dyadic common ground in a rather specific sense, namely as privately acquired knowledge that is shared *exclusively* by a couple (or by a few people only). However, the comprehensive common ground among familiar persons will also encompass pieces of knowledge that are shared by a larger part of the population as well, for example, knowledge about a popular movie that many people have seen. Contrary to unfamiliar partners, spouses are likely to be well-informed about each other's knowledge about popular films, books, news, or public events. Therefore, using a particular piece of publicly available knowledge to cue the spouse may bear more certainty about the cue's effectiveness. This may have advantages for collaborative cognition among familiar persons that are similar to the benefits of using shared knowledge derived from private common experiences.

Second, it is also possible that more *subtle* advantages of shared knowledge helped couples to succeed in the experimental task. For example, declarative cues (which simply relied on a description of objective features of the wanted target) were used both among unfamiliar partners and spouses. Still, among spouses, certain objective features may have been chosen as cues because the explaining partner was aware that they would work especially well. Some aspects of a target may have carried a subtle self-referential meaning for the partner, or may have had been activated in the partner's cognitive system just recently. For instance, the explaining partner may have recalled a recent conversation or an incident in which a certain feature of the target had

been highlighted (e.g., partners may have talked about the color of an object, but not about its shape). This may have served as a heuristic to choose cues that are likely to be understood better and processed more easily by the listener, as compared to a randomly chosen cue. Although such implicit idiosyncratic knowledge was not explicated in the cues given to the spouse, and was therefore not coded as dyadic common ground, it might still have worked in favor of the effectiveness of spousal cues.

4.7 Directions for Future Research

The present work introduced a novel experimental design and added to past findings on the effect of interactive expertise on collaborative performance by focusing on the domain of verbal efficiency. It furthermore provided an age-differential approach to interactive expertise by highlighting the age-specific role of interaction partners' shared knowledge for interpersonal communication. Future research could profit from following up on these contributions. In the following, I will suggest two major foci for future research on related topics. The first focus pertains to possible methodological supplements to the present work (section 4.7.1). The second suggested emphasis for future research highlights possible conceptual extensions of the present study and addresses particular dimensions of the investigated phenomena that were not at the center of the present work (section 4.7.2).

4.7.1 Methodological Extensions

Sample variations. Two sample variations seem particularly interesting for future research: clinical samples (e.g., older adults with dementia) and age-heterogeneous dyads. These two fields could be very promising for future research. It may be that the benefits of interactive expertise in general, and dyadic common ground in particular, are especially obvious in dyads in which one partner profits from the other partner's assistance. As suggested by previous research, cognitively skilled individuals use the interactive experience that they have acquired with a less skilled partner to optimally lead the collaboration on a joint task. For example, healthy older adults caring for a spouse with dementia have been reported to adapt their statements to the special needs of their spouse to help him or her with cognitive tasks (Cavanaugh et al., 1989; Cavanaugh, Kinney, Dunn, McGuire, & Nocera, 1994). Intriguing work on patients with severe amnesia also suggests that collaborating with a healthy individual can compensate for major illness-related losses in cognitive performance. In a study by Duff, Hengst, Tranel, and Cohen (2006), severely affected amnesiac patients collaboratively developed referential names for novel stimuli with a healthy

partner. Unexpectedly, amnesiac patients were able to learn referential names in this collaborative setting, and they finally performed just as well as control subjects in reliably using the referential names. A clear difference in the partners' cognitive abilities (such as in the case of dyads including one very old partner) may even result in particularly skilled collaboration, as this assigns the leading role to one of the partners. Krych-Appelbaum and colleagues (2007) found that optimal grounding for the partners' understanding of an issue was achieved if the speaker in a conversation scored *high* in a Theory-of-Mind task while the listener displayed comparatively *low* scores. They argued that the speaker's Theory-of-Mind related abilities might reflect this person's skills in taking the listener's perspective and leading the grounding procedure step by step. This finding is in line with the idea of scaffolding (cf. Vygotsky, 1978, for the initial proposition in the context of child development), according to which optimal performance may be reached by the less skilled individual when supported by the superior partner. This process of scaffolding may work particularly well among familiar partners who are informed about each others' strengths and weaknesses (cf. Meegan & Berg, 2002).

A multi-method approach to interactive expertise. The chosen task in the present study allowed a relatively natural course of participants' dialogue. However, investigating people's behavior experimentally in the laboratory is almost never achieved without concessions regarding ecological validity. This should also be assumed for the present work. Non-experimental approaches that directly address everyday-life interactions among familiar persons would therefore be a promising open avenue for future research. One option could be to observe participants in their natural environments (e.g., their homes) while they collaborate on real-life tasks. The literature suggests that the effect of interactive expertise is highly dependent on the collaborative task (Dixon 1999; Gould, 2004; Gould et al., 2002). Therefore, it seems critical that a multi-method approach to interactive expertise and the role of shared knowledge considers maximally comparable collaborative tasks. Optimally, a multi-trait–multi-method approach should be applied because differential effects seem likely for both variations – both on the side of the chosen method and on the side of the task. In addition to this, one may speculate that methodological variations might particularly affect older adults' performance, as has been outlined above in section 4.6.2. Therefore, future research should investigate possible interactions of participants' age with manipulations of the interactive context.

Alternative criteria for successful collaborative performance. The success in collaborative-cognitive tasks can be defined by various outcome measures. The present study focused on verbal efficiency, as operationalized by the number of words that participants needed to cue their partners. In real-life situations, the success of collaborative cognition is likely to encompass more

than one aspect of cognitive performance, and the weight of the different components will depend on the specific situation. Some results of collaborative performance may not even be evaluated by quantitative means at all, but can only be addressed by qualitative dimensions, as in the case of complex life decisions taken collaboratively. But even a clear focus on quantitatively measured verbal efficiency offers a variety of options of how to evaluate this construct. In the case of everyday negotiations, it may be especially important to use frugal but effective cues. Other tasks may require the reduction of opportunities for misunderstandings, for example, if delicate issues need to be communicated. Again, in other cases, it might be crucial to save time, for example, if a couple in a car needs to negotiate the route while the traffic light turns green. Future studies could address alternative outcomes of collaborative cognition, such as the number of misunderstandings (e.g., as measured by the number of wrong guesses taken by the listening partner), or the time needed to complete a task. With respect to age-comparative studies, it could be especially informative to investigate the relation of speed and accuracy of collaborative performance. It is possible that the success of collaborative cognition needs to be defined in an age-differential way, depending on the everyday-life benefits and costs associated with those dimensions. Apart from including alternative measures of verbal efficiency, future research could also profit from conceptual extensions of the present work.

4.7.2   Conceptual Extensions

This section will suggest two conceptual foci for future research. First, I will suggest investigating socio-emotional consequences of using interactive expertise and dyadic common ground. After this, I will outline possible research questions related to the genesis and the procedural mechanisms of the effects of interactive expertise and dyadic common ground on collaborative performance.

Socio-emotional benefits of interactive expertise and dyadic common ground. The main constructs of interest in the present study – partners' interactive expertise, and the use of dyadic common ground among familiar partners – were investigated with the focus on their potential as a means to optimize collaborative cognition. Accordingly, the effect of these factors was addressed by measuring participants' collaborative cognitive performance. However, drawing on interactive expertise with a familiar partner, and referring to dyadic common ground with him or her, may serve interpersonal purposes beyond the optimization of cognitive performance. Both drawing on general interactive expertise and on the according knowledge-based facet of dyadic common ground might offer emotional security because this may help to understand and predict the

partner's actions and utterances. A reported preference for working with a familiar, as opposed to an unfamiliar interaction partner, has been documented in former studies on collaborative cognition, especially among older adults (Dixon et al, 1998; Gould et al., 2002). A remaining open question for future research pertains to the particular socio-emotional consequences of the interpersonal cueing strategy of dyadic common-ground use with a familiar partner. Hardin and Higgins (1996) argue that creating a shared reality may enhance interpersonal trust among interaction partners. Accordingly, spouses might use dyadic common ground in their communication to validate their feeling of togetherness and thereby strengthen their relationship. If such attempts are successful (i.e., if the partner is able to relate to the personal, idiosyncratic information), this might be rewarding for the partners as it reconfirms their interpersonal closeness.[66] Future studies could choose to explicitly focus on participants' emotional reactions to using dyadic common ground, both on the side of the talking person, and of the receiver of such cues. One might, for example, obtain self-report data on both participants' affective states and their perception of the interaction after each trial, and complement this by measures of psycho-physiological arousal. Longitudinal follow-up studies could be used to investigate the possible predictive potential of dyadic common-ground use for partnership development (e.g., relationship satisfaction and relationship stability).

A process-oriented focus on interactive expertise and dyadic common ground: Genesis and mechanisms of action. The present study observed dyadic interactions in an experimental task and focused on the use and the usefulness of interpersonal specialization (i.e., of interactive expertise and dyadic common ground with a familiar partner) that was used in this situation, but that had mostly been established prior to the experimental situation. Little is known about the *genesis* of these resources in real-life settings (for an overview of the rather abundant findings from process-oriented approaches to grounding in laboratory settings, see Pickering & Garrod, 2004). Future research could profit from focusing on the questions of when in the course of a relationship, and how, interpersonal expertise is built. Along the same line, it could investigate the question concerning the timing in a relationship, and processes, by which partners arrive at a significant level of overlap in their idiosyncratic knowledge. Investigating these processes might bring particular benefits for developmental research: Older adults might take longer to establish interactive expertise and shared knowledge if confronted with unfamiliar interaction partners (Horton &

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[66] The complex design of the present study did not feature a sophisticated assessment of emotional dimensions of interpersonal collaboration. On the level of exemplary observations, the suggested emotional correlates of using dyadic common ground might have actually occurred in the participants. Experimenters reported that they perceived a clearly elevated level of enjoyment in familiar interaction partners if a target was successfully explained by using dyadic common ground. These personal observations must be interpreted with caution as the experimenters were not entirely blind to the purpose of the study, and their reports cannot be quantified. The exemplary observations may, however, motivate further research on the emotional consequences of using dyadic common ground.

Spieler, 2007; Hupet et al., 1993; Kemper et al., 1996). At the same time, older adults might profit from these resources substantially once they have been acquired. Developmental research could provide practitioners with knowledge about how to best support this interpersonal process, for example, in the case of caregiving relationships. Future studies could experimentally assign the amount of interactive expertise to persons of different age groups, for example, by having them work or live together for a circumscribed amount of time (e.g., in the context of a workshop or vacation camp, or by a long-term observation of repeated collaborations in laboratory settings). This would also enable researchers to address an approximation to the variable of relationship duration which is naturally confounded if investigating real-life partnerships in younger and older adults.

A different process-oriented approach that may be addressed by future research pertains to the way interactive expertise and dyadic common ground influence collaborative cognition. In the present study, I focused on the outcome of those interpersonal characteristics and did not undertake an in-depth investigation of the processes by which the investigated factors influenced performance. Interactive expertise encompasses comprehensive knowledge about interactive processes with a particular interaction partner. I emphasized one special component of interactive expertise by addressing the convergent stock of knowledge among familiar partners. One challenge for future research will be to identify additional components that contribute to the effect of interactive expertise on collaborative performance, such as the optimal interpersonal temporal coordination of speech units and the use of subtle non-verbal cues.

Additional research is also needed to better understand how exactly the special resource of dyadic common ground influenced verbal efficiency. The present study provided an insight into the outcomes of this strategy on the level of single trials, that is, it focused on the effect of this strategy with respect to a comprehensive communication goal (explaining the wanted target). An open question for future research will be to identify determinants of the quality of such cues. Dimensions of interest encompass the point in time in the course of a dialogue in which it is particularly effective to supplement objective descriptions with idiosyncratic components. It might, for example, be more effective to start a conversation with objective circumscriptions of the issue and to provide a particular piece of idiosyncratic information later on to further limit the ways this description may be interpreted by the partner.

4.8   Final Conclusions

Previous research has established the familiarity effect in collaborative cognition, that is, the general tendency of familiar partners to outperform unfamiliar dyads or groups. Among the complex factors that contribute to the experience-based sophistication of familiar partners' interactions, dyadic common ground between two familiar partners has been emphasized as one particular advantage. In the context of lifespan development, special benefits of these resources may be assumed for older, as compared to younger adults.

A strength of the present study consisted of the novel experimental paradigm that enabled the participants to fall back on their acquired knowledge while performing a cognitively demanding interactive task. Through the implemented within-person variation of interaction partners' familiarity, the investigation allowed for an age-comparative evaluation of the facilitative effect of partners' familiarity on communicative efficiency. Furthermore, an external trial-wise coding of the interactions among spouses provided insights into the usefulness of dyadic common ground as a cueing strategy.

Results point to a general advantage of partners' familiarity for performance, both in younger and older adults, while this familiarity effect was moderated in an age-differential way by participants' cognitive-mechanic abilities and by variables reflecting the amount of interactive practice among spouses. Findings furthermore revealed that using dyadic common ground with the spouse particularly supported older adults' performance. Overall, these results suggest that interactive expertise can enhance both younger and older adults' collaboration on communication tasks, and that dyadic common ground may be a resource that offers particular advantages to older adults' cognitive functioning.

Interactive expertise and dyadic common ground are inherently dyadic phenomena. Still, investigating age differences in the usefulness of these interpersonal characteristics may also provide us with information about the aging individual. Across the lifespan, collaborative situations occur frequently in everyday life and may help individuals to succeed in tasks that they cannot accomplish alone. In late life, this may become especially important because collaborating with others poses a means to compensate for aging-related losses. As this study has shown, social parameters in interactive situations can set the boundaries for cognitive performance. Gaining a better understanding about how people collaborate with each other and mutually influence each other therefore offers a promising research field for future developmental research.

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6. APPENDIX

6.1 Description of the Samples

Table A1
Sample of the Taboo Study: Descriptive Information on Cognitive Measures

	Younger Adults		Older Adults	
	M	*SD*	*M*	*SD*
Perceptual and Motor Speed	60.17	9.32	41.31	8.61
Word Fluency [a]	61.30	12.57	54.73	12.16
Word Knowledge	29.88	2.21	30.59	2.24

The measure of word fluency (cf. Lindenberger & Baltes, 1997) was assumed to be a crucial skill for completing the experimental task in the present study. It was assessed by asking participants to name as many words from a given category as they can in 90 seconds. We used two categories (animals; words that start with the letter "s", with 90 seconds provided for each subtest). The task was recorded and later coded according to the procedure used in the Berlin Aging Study (BASE, Lindenberger, Mayr, & Kliegl, 1993). The scores reported above pertain to each participant's mean performance across the two subtests on word fluency. Ten percent of the word-fluency data was coded again by an independent second rater to determine the inter-rater reliability, which was good (ICC based on single ratings = .92; average ICC = .96).

Table A2

Socio-Demographic Characteristics of the Word-Rating Pre-Study Sample by Age Group (N = 65)

	Younger Adults *(n = 19)*		Middle-Aged Adults *(n = 19)*		Older Adults *(n = 27)*	
Sex						
Male	10	(53%)	10	(53%)	14	(50%)
Female	9	(47%)	9	(47%)	13	(50%)
Age (in years)						
Range	19.93–30.94		46.02–55.84		70.13–80.29	
M	26.06		50.61		74.40	
SD	3.34		3.03		2.72	
Educational Level						
Primary school/ Junior High (8th grade) [a]	0	(0%)	4	(21%)	6	(22%)
Secondary school level 1 (10th grade) [b]	7	(37%)	4	(21%)	6	(22%)
High school (12th/13th grade) [c]	8	(42%)	1	(5%)	3	(11%)
Technical College/ University [d]	3	(16%)	9	(47%)	11	(41%)
Unknown	1	(5%)	1	(5%)	1	(4%)
Current Occupation [e]						
Full-time employed	1	(5%)	3	(16%)	0	(0%)
Part-time employed	2	(11%)	4	(21%)	0	(0%)
Apprentice	4	(21%)	0	(0%)	0	(0%)
University Student	7	(37%)	0	(0%)	0	(0%)
Homemaker	0	(0%)	1	(5%)	1	(4%)
Unemployed	3	(16%)	4	(21%)	0	(0%)
Retired	0	(0%)	2	(11%)	25	(93%)
Other	1	(5%)	4	(21%)	0	(0%)
Missing	1	(5%)	1	(5%)	1	(4%)
Marital Status						
Married	1	(5%)	12	(63 %)	21	(78%)
Unmarried	14	(74%)	3	(16%)	0	(0%)
Widowed	0	(0%)	0	(0%)	2	(7%)
Divorced	0	(0%)	3	(16%)	2	(7%)
Missing	4	(21%)	1	(5%)	2	(7%)
Duration of current relationship						
Range (years)	0.35 – 16.35		2.52 – 36.44		3.46 – 57.52	
M	3.76		21.02		42.87	
SD	4.12		13.20		14.55	

[a] German: Grundschule.

[b] German: Realschule/Mittlere Reife.

[c] German: (Fach-) Abitur.

[d] German: Fach-/Hochschulstudium.

[e] Multiple categories possible (percentages do not add up to 100).

6.2 Stimuli

Table A3
Overview of the Target Words and Their Features

German wording [a]	English translation	Everyday-life reference [b]	Frequency [c]	Length [d]	Morphology [e]	Main Set [f]	Subset [f]
Auflauf	casserole	-0.59	16	7	single noun	A	A2
Axt	ax	-0.87	13	3	single noun	B	B2
Bad	bathroom	1.74	11	3	single noun	A	A1
Badekappe	bathing cap	-0.08	18	9	composite noun	B	B2
Bankräuber	bank-robber	0.90	13	10	composite noun	B	B1
Batterie	battery	1.09	14	8	single noun	B	B2
Bett	bed	2.21	10	4	single noun	B	B2
Brandstifter	fire-raiser	0.74	13	12	composite noun	B	B2
Bratpfanne	frying pan	1.15	16	10	composite noun	A	A2
Briefkasten	letterbox	0.92	13	11	composite noun	A	A1
Brot	bread	2.03	11	4	single noun	A	A2
Buckel	hump	-0.20	14	6	single noun	A	A1

[a] Words are shown in alphabetical order according to their German wording.   *(Table continues)*

[b] Everyday-life reference = means from the z-standardized ratings of all age three age groups (range within the selected words: -1.15–2.21, see section 2.4.2).

[c] Word frequency in the media is indicated in relation to the most frequent word in German ("der", the male nominative, see section 2.4.2). The value of 14 means that the word is 2^{14} times less frequent than the word "der" (range within the selected words: 10 (more frequent)–19 (less frequent).

[d] Word length = Number of letters (see section 2.4.2).

[e] Derivations and neoclassic nouns were considered as single nouns.

[f] Denotes the assignment to experimental sets of stimuli, see section 2.4.2.

Table A3 *(continued)*

German wording [a]	English translation	Everyday-life reference [b]	Frequency [c]	Word length [d]	Morphology [e]	Main Set [f]	Subset [f]
Dinosaurier	dinosaur	0.51	13	11	single noun	A	A1
Eisberg	ice berg	0.15	15	7	composite noun	B	B1
Erdbeere	strawberry	0.84	16	8	composite noun	A	A1
Fahrrad	bicycle	1.19	11	7	composite noun	A	A2
Fallschirm	parachute	-1.02	14	10	composite noun	A	A1
Fernseher	television	1.38	11	9	single noun	B	B1
Feuerleiter	Fire ladder	-0.07	18	11	composite noun	B	B2
Flaschenpost	message in a bottle	0.32	16	12	composite noun	A	A2
Floh	flea	-0.19	15	4	single noun	B	B1
Friseur	hair dresser	0.84	13	7	single noun	B	B2
Gurke	cucumber	1.00	15	5	single noun	B	B1
Handtuch	towel	1.56	13	8	composite noun	A	A1
Hausschuhe	slippers	-0.14	17	10	composite noun	B	B2
Haustür	front door	0.41	12	7	composite noun	B	B1
Iglu	igloo	-0.37	16	4	single noun	A	A2
Karawane	caravan	-1.11	13	8	single noun	B	B1
Keks	cookie	0.85	15	4	single noun	B	B2

[a, b, c, d, e, f] See footnotes on the first page of the table.   *(Table continues)*

Table A3 *(continued)*

German wording [a]	English translation	Everyday-life reference [b]	Frequency [c]	Word length [d]	Morphology [e]	Main Set [f]	Subset [f]
Kochtopf	saucepan	1.05	15	8	composite noun	B	B2
Matratze	mattress	0.14	14	8	single noun	B	B1
Murmel	marble	-0.09	17	6	single noun	A	A2
Nixe	mermaid	0.38	16	4	single noun	A	A1
Oktoberfest	Oktoberfest	-0.91	13	11	composite noun	A	A2
Pfeffermühle	pepper mill	0.41	17	12	composite noun	B	B1
Pirat	pirate	0.14	16	5	single noun	B	B2
Pudel	poodle	-1.15	14	5	single noun	B	B1
Pullover	pullover	0.63	13	8	single noun	A	A2
Regenschirm	umbrella	0.56	14	11	composite noun	B	B2
Schäfer	shepherd	0.35	11	7	single noun	A	A2
Schnorchel	snorkel	-0.91	17	10	single noun	B	B1
Seilbahn	funicular	-0.95	14	8	composite noun	A	A2
Shampoo	shampoo	0.73	15	7	single noun	B	B1
Spülmaschine	dishwasher	0.06	16	12	composite noun	A	A1
Strasse	street	1.53	15	7	single noun	A	A1
Teelicht	tealight	-0.42	19	8	composite noun	A	A2
Ufo	UFO	0.03	15	3	single noun	A	A1
Vogelscheuche	scarecrow	-1.01	17	13	composite noun	A	A1

[a, b ,c, d, e, f] See footnotes on the first page of the table.

6.3   Measures

Table A4
Overview of the Measures Assessed in the Taboo Study

TARGET DOMAIN	CONSTRUCT	INSTRUMENT	*N* OF ITEMS	AUTHOR(S)
Demographics	Age, education, marital status, relationship duration	Demographic Questionnaire	12	Newly developed
Cognition	Perceptual and motor speed	Digit—Symbol Substitution Test (HAWIE)	–	Wechsler (1955)
	Vocabulary	Vocabulary Test MWT-A	37	Lehrl (1977)
	Word fluency	Word production task	–	Lindenberger et al., 1993
Behavioral measures	Number of words needed by the explaining partner in each trial	Independent coding by three trained coders	–	Newly developed coding manual
	Number of wrong guesses taken by the listener in each trial	Independent coding by three trained coders	–	Newly developed coding manual
	Use of dyadic common ground in each trial	Independent coding by three trained coders	–	Newly developed coding manual

(Table continues)

Table A4 *(continued)*

TARGET DOMAIN	CONSTRUCT	INSTRUMENT	N OF ITEMS	AUTHOR(S)
Personality	Neuroticism, Extraversion, Openness, Conscientiousness, Agreeableness	NEO-FFI	30	Costa & McCrae (1985); German by Borkenau & Ostendorf (1993)
	Shyness and sociability	Schüchternheits- und Geselligkeitsskalen [Shyness and Sociability scales]	9	Asendorpf (1997)
	Social motive	Belongingness Scale, Subscale Social Assurance	8	Lee & Robbins (1995), own German translation
	Social network	Circle Diagram	–	Kahn & Antonucci (1980)
	Affiliation motive	Multi-Motive Grid	14	Sokolowski (2000)
	Personal interests and leisure time activities	Interest Scale	10	Newly developed
Task-related self-report	Mutual sympathy [b]	Final Self-Report Questionnaire	7	Newly developed
	Task motivation [b]	Final Self-Report Questionnaire	12	Newly developed
	Intra- and interpersonal attribution of task success/failure [b]	Final Self-Report Questionnaire	3	Newly developed
	Subjective use of cueing strategies [a]	Final Self-Report Questionnaire	6	Newly developed

[a] Assessed after study completion.   *(Table continues)*

Table A4 *(continued)*

TARGET DOMAIN	CONSTRUCT	INSTRUMENT	N OF ITEMS	AUTHOR(S)
Relationship	Relationship quality	Relationship Assessment Scale (RAS)	7	Hendrick (1988); German by Hassebrauck (1991)
	Time spent daily with the partner	Single item		Newly developed
	Interpersonal Closeness [a]	Inclusion of Other in the Self Scale (IOS, single graphical item)	1	Aron, Aron, & Smollan (1992)
	Shared friends [a]	Single graphical item	1	Newly developed (adapted from Aron et al., 1992)
	Shared leisure activities [a]	Final Self-Report Questionnaire	7	
	Communication	Marital Communication Inventory (MCI, subscales Discussion and Attention)	25	Bienvenu (1970)
	Important life events shared with the partner [a]	Final Self-Report Questionnaire	13	Newly developed
	Subjective common ground shared with the spouse [a]	Common Ground Scale	8	Newly developed
Filler Task		Selected Items from the IST 2000 (Intelligenz-Struktur-Test) [Structure of Intelligence Test]	26	Amthauer, Brocke, Liepmann, & Beauducel (1999)

[a] Assessed after study completion.

Table A5
Variable Distributions

Variables	N	M	SD	Skewness (SE)	Kurtosis (SE)
Words needed in a trial *(raw distribution)* [a]	3496	10.55	10.42	3.51 (.04)	19.27 (.08)
Words needed in a trial *(after logarithmic transformation)* [a, b]	3496	0.88	0.34	0.16 (.04)	0.10 (.08)
Dyadic Common Ground	1763	0.31	0.42	0.81 (.06)	-1.11 (.12)
Digit–Symbol Performance Relationship Duration	165	50.50	13.01	0.22 (.19)	-0.34 (.39)
Social Network	151	17.25	8.21	0.72 (.20)	0.76 (.39)
Target Difficulty [a]	3496	10.41	2.65	0.56 (.04)	0.07 (.08)
Wrong guesses taken in a trial [a]	3496	1.11	1.71	2.79 (.04)	13.15 (.08)

[a] $\log_{10}(x)$
[b] The distribution across trials is indicated.

6.4   Development of Models to Predict the Number of Guesses

In two follow-up analyses, I tested the influence of guesses taken by the listening partner on the number of words needed by the explaining partner (see sections 3.1.4 and 3.2.5 in part 3). The development of these models (one for the total sample, and one for the subsample of trials completed among spouses only) is summarized in Tables A7 and A8. The notation of these models is equivalent to Equations 1–4 in part 2 except for the indices of the components. When modeling the number of guesses taken, the guessing partner (instead of the explaining partner) was considered the main cause of the variance in this variable. Therefore, the variance due to the guessing partner, and the variance due to the guessing partner's partnership, were included into the models *before* testing an additional contribution to the overall variance by the explaining partner (and by the explaining partner's partnership).

Analyses using the number of guesses taken as a predictor may lead to more reliable estimates because the assumption of normality was violated for the distribution of this variable. Therefore, the additional analyses reported in sections 3.1.4 and 3.2.5 should be considered more informative. These analyses included the number of guesses as a predictor (considered in relation to the provided cues, thus indicating the interactive nature of a trial).

Table A6
Predicting the Number of Guesses: Model Development and Chosen Model: Total Data Set (N = 3496 Trials) [a]

Predicting the number of wrong guesses in the subsample of spouses

Model	Variance components included in the model [b]					Model Fit (- 2 Log Likelihood)	$\Delta\chi^2$ (df = 1)	Compared to Model
	Trial	Guessing Partner	Explaining Partner	Guessing Partner's Partnership	Explaining Partner's Partnership			
1	2.846	–	–	–	–	13582.4	–	–
2	2.630	.220	–	–	–	13469.8	112.6*	1
3	2.583	.153	.106	–	–	13452.5	17.3*	2
4	2.630	.078	–	.144	–	13454.6	15.2*	2
5	**2.589**	**.061**	**.075**	**.120**	**–**	**13442.4**	**10.1***	**3**
7	2.589	.063	.062	.104	.024	13441.9	0.5 *n.s.*	5

[a] The final model is printed in boldface.

[b] The proportion of variance in the dependent variable accounted for by the respective component is indicated.

* *p* < .01. *n.s.* not significant

Table A7

Predicting the Number of Guesses: Model Development and Chosen Model for the Subsample of Trials Completed Among Spouses (n = 1763) [a]

Predicting the number of wrong guesses in the subsample of spouses

Model	Variance components included in the model [b]			Model Fit (- 2 Log Likelihood)	$\Delta\chi^2$ (df = 1)	Compared to Model
	Trial	*Guessing Partner*	*Couple*			
1	2.733	–	–	6779.5	–	–
2	2.694	.269	–	6754.7	24.8*	1
3	**2.424**	**.118**	**.200**	**6696.5**	**58.2***	**2**

[a] The final model is printed in boldface.

[b] The proportion of variance accounted for by the respective component is indicated.

* $p < .05$. *n.s.* not significant

6.5 Results From Follow-up Analyses

Table A8

Follow-Up Analyses: Estimates for the Familiarity Effect by Digit–Symbol Quartiles, Using Difficult Targets Only (Median Split of Total Sample Based on Target Difficulty) [a]

Digit–Symbol Quartile	Parameter Estimates for Partners' Familiarity		
	β	*t*	*df*
Above 75th percentile [b]	.02	0 .68	110.0
51th–75th percentile [c]	.11*	3.18	74.6
26th–50th percentile [d]	.07*	2.28	3222.0
Below 25th percentile [e]	.08*	2.43	147.0

[a] Predicting the number of words needed (log-transformed distribution)

[b] $N = 494$ trials. Additional predictors: Order of Conditions ($\beta = .002$, $t = .03$ [14.3], *n.s.*), Use of Forbidden Words ($\beta = -.13$, $t = -.49$ [446], *n.s.*), Guessing Partner's Digit–Symbol Score ($\beta = .0003$, $t = .11$ [39.5], *n.s.*).

[c] $N = 446$ trials. Additional predictors: Order of Conditions ($\beta = .04$, $t = .57$ [23.8], *n.s.*), Use of Forbidden Words ($\beta = .12$, $t = .42$ [392], *n.s.*), Guessing Partner's Digit–Symbol Score ($\beta = -.004$, $t = -1.58$ [63.3], *n.s.*).

[d] $N = 509$ trials. Additional predictors: Order of Conditions ($\beta = .04$, $t = .78$ [33.6], *n.s.*), Use of Forbidden Words ($\beta = -.28$, t = -1.27 [446], n.s.), Guessing Partner's Digit–Symbol Score ($\beta = -.007$, t = -3.73 [69.3], $p < .05$).

[e] $N = 372$ trials. Additional predictors: Order of Conditions ($\beta = .06$, $t = 1.17$ [26], *n.s.*), Use of Forbidden Words ($\beta = -.87$, $t = -4.72$ [346], $p <.05$), Guessing Partner's Digit–Symbol Score ($\beta = -.0003$, $t = -.11$ [45.7], *n.s.*).

Note. Different *Ns* result from invalid trials. * $p < .05$.

ZUSAMMENFASSUNG

Theoretischer Hintergrund, Forschungsfragen und Hypothesen

Die vorliegende Dissertation untersuchte Altersunterschiede in der Zusammenarbeit jüngerer und älterer Erwachsener bei einer dyadischen kognitiven Aufgabe. Von zentralem Interesse war hierbei, Faktoren zu identifizieren, welche die Zusammenarbeit besonders für ältere Personen erleichtern.

Die Zusammenarbeit mit anderen Personen bei kognitiven Aufgaben stellt eine häufige Erfordernis vieler Alltagssituation dar (Levine, Resnick, & Higgins, 1993). Kognitive Zusammenarbeit (*collaborative cognition*) kann mit Dixon (1999) definiert werden als jegliche kognitive Aktivität, bei der (a) eine weitere oder mehrere andere Personen anwesend oder aktiv beteiligt sind und bei der (b) zwei oder mehr Personen geteilte kognitive Repräsentationen eines gemeinsamen Ziels der kognitiven Aktivität haben (vgl. M. M. Baltes & Carstensen, 1999; Clark, 1985; Tomasello, Carpenter, Call, Behne, & Moll, 2005; Wegner, 1986). Als kontextuelle Rahmenbedingung individueller kognitiver Leistungen ist die Zusammenarbeit bei kooperativen Aufgaben aus entwicklungspsychologischer Perspektive interessant. Kognitiv-mechanische Fähigkeiten (d.h. die stark durch biologische Faktoren beeinflusste Geschwindigkeit und Qualität kognitiver Informationsverarbeitung) nehmen im Laufe des Erwachsenenalters ab. Im hohen Erwachsenenalter zeigen sich besonders starke Verluste (Case, 1985; Lindenberger & Reischies, 1999). Die Theorie der Selektion, Optimierung und Kompensation (SOK, P. B. Baltes & Baltes, 1990; vgl. Riediger, Li, & Lindenberger, 2006) betont die Möglichkeit von Individuen, solche Verluste durch kompensatorische Prozesse auszugleichen. Die Kompensation erlittener oder antizipierter Verluste ist durch eine Vielzahl von Mitteln erreichbar, wie z.B. durch verstärkte Bemühungen oder die Inanspruchnahme externer Hilfsmittel. Die vorliegende Dissertation konzentrierte sich auf die Zusammenarbeit mit anderen Personen als eine Möglichkeit, alterskorrelierte Leistungsdefizite in mechanisch-kognitiven Fähigkeiten auszugleichen (z.B. Dixon, 1999; Martin & Wight, 2008).

Interaktionen mit anderen Personen implizieren jedoch auch kognitive Kosten, welche die Nützlichkeit der Zusammenarbeit mindern können. Neben anderen Formen der Zusammenarbeit (siehe P. B. Baltes & Staudinger, 1996; Martin & Wight, 2008; Strough & Margrett, 2002) bezog sich der konzeptuelle Rahmen der vorliegenden Arbeit vor allem auf die Forschung zur Zusammenarbeit an Gedächtnisaufgaben. Diese Form der Zusammenarbeit ist im Alltagsleben von starker Bedeutung und kann besonders im hohen Erwachsenenalter helfen,

defizitäre Gedächtnisleistungen auszugleichen (z.B. Dixon, 2001). Diese Forschung konnte zeigen, dass zusammenarbeitende Personen verschiedener Altersgruppen einzelne Individuen in ihrer Gedächtnisleistung übertreffen (Dixon, 2001; Martin & Wight, 2008). Gleichzeitig belegte jedoch eine Vielzahl von Studien, dass zusammenarbeitende Personen meist hinter dem erwarteten Potenzial der Zusammenarbeit zurückbleiben: Verglichen mit der Leistung nomineller Gruppen (d.h. der addierten Leistung separat arbeitender Individuen) zeigen zusammenarbeitende Gruppen eine schlechtere Leistung (Dixon, 2001). Dies weist darauf hin, dass Personen in der Interaktion mit Anderen nicht ihr individuelles Potenzial ausschöpfen. In der Literatur wird dieser wiederholt replizierte Befund vor allem in Hinblick auf die kognitiven Kosten der Zusammenarbeit diskutiert (z.B. Weldon & Bellinger, 1997). Die zentrale Fragestellung der vorliegenden Untersuchung war daher:

Wie kann die Zusammenarbeit bei kognitiven Aufgaben im hohen Erwachsenenalter erleichtert werden?

Zwei potentielle Faktoren wurden in dieser Dissertation untersucht: *Interaktive Expertise* (Dixon, 1999) und *dyadisch geteiltes Wissen* (dyadic common ground, Clark & Marshall, 1981). Interaktive Expertise beschreibt komplexes erfahrungsbasiertes Wissen darüber, wie Interaktionen mit einem bestimmten Partner optimiert werden können. Bekannte Personen sind aufgrund früherer interaktiver Erfahrungen in der Lage, die Handlungen und Äußerungen des Partners mit größerer Zuverlässigkeit und Mühelosigkeit zu interpretieren und vorherzusagen als unbekannte Personen (Dixon, 1999). Dies kann die Interaktion erleichtern, was besonders älteren Personen zum Vorteil gereichen könnte, deren Leistung sensitiv auf komplexe Aufgabenanforderungen reagiert (vgl. Hull, Martin, Beier, Lane, & Hamilton, 2008; Kray & Lindenberger, 2000; Lindenberger, Marsiske, & Baltes, 2000). Entsprechend ist wiederholt argumentiert worden, dass interaktive Expertise für ältere Personen nützlicher sein könnte als für jüngere Personen (vgl. Amizita, 1996; Dixon, 1999; 2000; Johansson et al., 2005). Empirische Belege dieser Vermutung sind jedoch bislang kaum verfügbar und teilweise widersprüchlich (vgl. Dixon & Gould, 1998; Gould, Osborn, Krein, & Mortenson, 2002). Ein zentrales Anliegen dieser Dissertation war es daher, diese Frage zu untersuchen. Die empirische Untersuchung fokussierte auf dyadische Kommunikation als zentrales Mittel für kognitive Zusammenarbeit. Die Aufgabe der Studienteilnehmer bestand darin, einem Interaktionspartner Zielbegriffe zu erklären und dabei eine minimale Anzahl erklärender Wörter zu benötigen. Diese Aufgabe modellierte damit eine typische Kommunikationsaufgabe im Alltagsleben, bei der eine Idee an einen Interaktionspartner vermittelt werden muss, welcher zu Beginn der Interaktion uninformiert über das Kommunikationsziel ist. Interaktive Expertise wurde operationalisiert, indem die

Zusammenarbeit zwischen Ehe- oder Lebenspartnern bei einer Kommunikationsaufgabe mit der entsprechenden Leistung fremder Interaktionspartner verglichen wurde. Für die Fragestellung zur Wirkung interaktiver Expertise auf die Leistung wurden folgende Hypothesen formuliert:

Hypothese 1.1: *Ehe- oder Lebenspartner benötigen zur Erklärung der Zielbegriffe weniger Wörter als unbekannte Interaktionspartner.*

Hypothese 1.2: *Dieser Leistungsvorteil bei der Interaktion mit dem Ehe- oder Lebenspartner ist für ältere Personen stärker als für jüngere Personen.*

Über diese Hypothesen hinaus untersuchte ich in der Dissertation eine zweite Fragestellung und fokussierte auf eine spezifische Facette von interaktiver Expertise: Ein Vorteil bei der Kommunikation mit einem bekannten Partner besteht darin, dass dyadisch geteiltes Vorwissen in der Interaktion genutzt werden kann (Clark & Marshall, 1981; Clark, 1996). Die Verarbeitung dieser bekannten Wissensinhalte erfordert weniger kognitive Ressourcen als unbekanntes Wissen (z.B. Wu & Keysar, 2007) und kann zu effektiverer und effizienterer Kommunikation führen (vgl. Andersson & Rönnberg, 1997; Fussell & Krauss, 1989; Pickering & Garrod, 2004). Diese Facette interaktiver Expertise könnte gezielt helfen, alterskorrelierte Schwierigkeiten in der Zusammenarbeit auszugleichen: Zum einen stellt dyadisch geteiltes Wissen eine externe Unterstützung bei der kognitiven Verarbeitung dar und erfordert daher weniger Prozesse, die das Individuum selbständig initiieren muss (vgl. Craik, 1994). Zusätzlich kann dyadisch geteiltes Wissen die Notwendigkeit zur Perspektivenübernahme verringern, weil persönliches Wissen (welches relativ einfach abzurufen und zu verarbeiten ist) Schnittstellen mit dem Wissen des bekannten Partners aufweist (vgl. Wu & Keysar, 2007). Beide Vorteile betreffen Aspekte, die an ältere Personen besondere Anforderungen stellen (z.B. Craik, 2000; Ligneau-Hervé & Mullet, 2005). Werden diese Anforderungen durch den Gebrauch dyadisch geteilten Wissens minimiert, könnte das insbesondere die Leistung älterer Personen verbessern und dazu beitragen, alterskorrelierte Leistungsunterschiede auszugleichen. Empirische Belege für diese Vermutung sind bislang nicht verfügbar, weshalb die vorliegende Untersuchung durchgeführt wurde, um diese Lücke zu schließen. Für den Effekt von dyadisch geteiltem Wissen auf die dyadische Leistung miteinander bekannter Interaktionspartner wurden folgende Hypothesen aufgestellt:

Hypothese 2.1:   *Die Nutzung dyadisch geteilten Wissens reduziert die Anzahl der Wörter, die benötigt werden, um dem Ehe- oder Lebenspartner den Zielbegriff zu erklären.*

Hypothese 2.2:   *Dieser positive Effekt dyadisch geteilten Wissens auf die Leistung ist für ältere Personen stärker als für jüngere Personen.*

Methode

Die Stichprobe der empirischen Studie bestand aus zusammenlebenden heterosexuellen Paaren aus zwei Altersgruppen: jüngere Erwachsene (*n* = 76; 20–33 Jahre) und ältere Erwachsene (*n* = 80; 63–79 Jahre). Die Teilnehmer nahmen jeweils an einer Sitzung zur Erfassung der Kovariaten teil und an zwei experimentellen Sitzungen, in welchen sie die dyadische Kommunikationsaufgabe bearbeiteten. Das experimentelles Paradigma wurde neu entwickelt und basierte auf der Grundlage des Gesellschaftsspiels Tabu©. Die Aufgabe bestand darin, einem Interaktionspartner 12 Begriffe zu erklären und dabei so wenige erklärende Wörter wie möglich zu benötigen. Für jeden Zielbegriff wurde eine Liste von erklärenden Wörtern vorgegeben, die nicht verwendet werden sollten. Diese Regel sollte eine minimale Aufgabenschwierigkeit gewährleisten und die Schwelle senken, alternative Erklärungsstrategien als optische Beschreibungen oder Kategorienzuweisungen zu nutzen (wie z.B. auf dyadisch geteiltes Wissen Bezug zu nehmen). Als Maß für die Leistung diente die Anzahl der erklärenden Wörter bis zur korrekten Lösung durch den ratenden Partner. Diese Aufgabe wurde in zweierlei Hinsicht experimentell manipuliert (jeweils innerhalb von Personen): in Bezug auf die Bekanntheit der Interaktionspartner und in Bezug auf die Zielbegriffe. Um die Bekanntheit der Interaktionspartner zu variieren, nahm jeder Teilnehmer an zwei getrennten dyadischen Sitzungen teil. Dabei erklärte jede Person jeweils 12 Zielworte, wobei sie in der einen Sitzung mit ihrem Ehe- oder Lebenspartner, und in der anderen Sitzung mit einem unbekannten gegengeschlechtlichen Interaktionspartner der gleichen Altersgruppe zusammenarbeitete. Die Reihenfolge der experimentellen Bedingung war balanciert. Neben dieser experimentellen Manipulation der dyadischen Konstellation (bekannter vs. unbekannter Interaktionspartner) wurde der Alltagsbezug der zu erklärenden Zielbegriffe innerhalb von Personen experimentell variiert. Dies hatte zum Ziel, eine möglichst große Varianz in der Nutzung dyadisch geteilten Wissens zu erzielen. Die Auswahl der in der Studie verwendeten Zielbegriffe und ihre gezielte Variation basierten auf (a) einer unabhängigen Vorstudie und (b) der Berücksichtigung mehrerer Worteigenschaften. In der Vorstudie schätzten 65 in festen Partnerschaften lebende Erwachsene aus drei Altersgruppen (*n* = 19 junge, *n* = 19 mittelalte und *n* = 27 ältere Erwachsene) 2688

Begriffe hinsichtlich ihres Alltagsbezugs ein. Für die Hauptstudie wurden Begriffe ausgewählt, die von allen drei Altersgruppen übereinstimmend als besonders hoch oder besonders niedrig hinsichtlich ihres Alltagsbezugs eingeschätzt wurden. Die Begriffe in den vier Kartensets zur Anwendung in den verschiedenen Sitzungen und Bedingungen der Hauptstudie waren zusätzlich stratifiziert nach ihrer Häufigkeit in den Medien, ihrer Länge und ihrer Morphologie.

Die in der Dissertation verwendeten behavioralen Maße wurden durch externe Kodierung ermittelt. Drei unabhängige, trainierte Kodiererinnen kodierten alle auf Video aufgezeichneten Interaktionen aller Sitzungen. Dabei wurden für jeden erklärten Zielbegriff folgende Variablen für die Äußerungen des erklärenden Partners ermittelt: (a) die Anzahl benötigter erklärender Wörter bis zur richtigen Lösung, (b) die Anzahl der Erklärungswege oder Ideen, (c) die Anzahl verbotener Wörter oder Erwähnung des eigentlichen Zielbegriffs und (d) die Anzahl von Hinweisen, die auf dyadisch geteiltes Wissen Bezug nahmen. Für die ratende Person wurde pro Zielbegriff bestimmt, wie viele falsche Rateversuche sie unternahm. Als Kovariate wurden kognitiv-mechanische Fähigkeiten mit dem Digit–Symbol Substitution Test (Wechsler, 1955) erfasst. Die Teilnehmer machten zudem Angaben zu soziodemografischen Fragen, zur Dauer ihrer Partnerschaft und zur Größe ihres sozialen Netzwerks (Kahn & Antonucci, 1980).

Um der komplexen Datenstruktur gerecht zu werden, wurden die Daten mithilfe von Mehrebenenanalysen (Multilevel Modeling, MLM) unter Nutzung des SAS-Moduls PROC MIXED (SAS Institute Inc., 2002) ausgewertet. Aufbauend auf einem Ansatz von Snijders & Kenny (1999) zur MLM-Analyse abhängiger Daten verließ der gewählte Ansatz den Bereich konventioneller Mehrebenenmodelle und berücksichtigte (a) die Abhängigkeiten zwischen den mehrfachen Durchgängen innerhalb einer Sitzung, (b) den Einfluss der Fähigkeiten der erklärenden Person auf die Leistung, (c) den Einfluss der Fähigkeiten der ratenden Person auf die Leistung und (d) die Ähnlichkeit zwischen der Leistung von Ehe- oder Lebenspartnern. Innerhalb dieser Modelle diente die Anzahl der erklärenden Wörter als Kriterium und verschiedene Variablen gemäß den Hypothesen und entsprechenden Folgeanalysen als Prädiktoren.

Ergebnisse und Diskussion

Ältere Erwachsene benötigten insgesamt mehr Wörter zur Erklärung der Zielbegriffe als jüngere Erwachsene. Dieser erwartete Alters-Haupteffekt bildete die Basis für die Testung der Hypothesen der vorliegenden Untersuchung, welche sich entlang der zwei Forschungsfragen in zwei Teile gliedern lassen.

Forschungsfrage 1 betraf die Wirkung von interaktiver Expertise. Hier zeigte sich hypothesenkonform (*Hypothese 1.1*), dass junge wie ältere Personen weniger Wörter zur Erklärung der Zielbegriffe benötigten (also eine bessere Leistung erzielten), wenn sie mit ihrem Ehe- oder Lebenspartner zusammenarbeiteten, als wenn sie mit einem fremden Partner arbeiteten. Dieser Befund korrespondiert mit den Ergebnissen früherer Studien, die eine überlegene Leistung bekannter Interaktionspartner im Vergleich zu unbekannten Personen in verschiedenen kooperativen Aufgaben belegen (z.B. Andersson, 2001; Dixon & Gould, 1998; Fussell & Krauss, 1989) und ergänzt diese Befunde um entsprechende Evidenz im Bereich interpersonaler Kommunikation. Die Hypothese, ältere Personen würden mehr als jüngere Personen davon profitieren, mit einem bekannten Partner zu arbeiten (*Hypothese 1.2*), konnte dagegen nicht bestätigt werden: Der Bekanntheitseffekt auf die Leistung war vergleichbar für jüngere und ältere Personen. Folgeanalysen lieferten jedoch indirekte Evidenz dafür, dass die Bekanntheit mit dem Interaktionspartner besonders für die Leistung älterer Personen wichtig sein könnte. Je schlechter die Leistung der Teilnehmer im Digit–Symbol Substitution Test war, desto stärker war der Leistungsvorteil bei der Interaktion mit dem bekannten Partner im Vergleich zur Interaktion mit dem fremden Partner. Da der Digit–Symbol Substitution Test als reliabler Indikator alterskorrelierter kognitiver Abbauprozesse etabliert ist (vgl. Hoyer, Stawski, Wasylyshyn, & Verhaeghen, 2004), könnten ältere Erwachsene in der Gesamtpopulation (im Gegensatz zu jüngeren Erwachsenen) mit höherer Wahrscheinlichkeit besonders von interaktiver Expertise profitieren. Diese Folgeanalyse stützt die Vermutung, dass interaktive Expertise helfen kann, alterskorrelierte Verluste in kognitiv-mechanischen Fähigkeiten auszugleichen. Zusätzlich unterstreicht dies die Notwendigkeit, vermittelnde Faktoren der in der Literatur vorgeschlagenen Altersunterschiede in der Nützlichkeit von interaktiver Expertise zu untersuchen. Angesichts der beträchtlichen Varianz in kognitiv-mechanischen Entwicklungsverläufen sollte das chronologische Alter als Basis für die Suche nach vermittelnden Faktoren, jedoch nicht als hinreichende Erklärung dienen.

Weitere Folgeanalysen wiesen auf die Rolle sozialer Variablen für den Bekanntheitseffekt hin: Bei Personen mit einem relativ kleinen sozialen Netzwerk profitierten ältere Personen mehr als jüngere Personen von der Bekanntheit mit dem Partner. Dies lies sich zurückführen auf komplexe Interaktionseffekte zwischen der Bekanntheit der Partner, der Altersgruppe, und der Größe des sozialen Netzwerks der Person. Jüngere Personen profitierten mehr von der Bekanntheit mit dem Partner, wenn sie ein großes soziales Netzwerk angaben. Dagegen war der Vorteil von der Bekanntheit mit dem Partner für die Leistung bei älteren Personen dann größer, wenn sie ein kleineres soziales Netzwerk berichteten. Dies legt die Vermutung nahe, dass bei

jüngeren Erwachsenen, welche sich in einer vergleichsweise frühen Phase ihrer Partnerschaft befinden, ein großes soziales Netzwerk die Entwicklung interaktiver Expertise begünstigt. Jüngere Paare könnten soziale Kontakte, die sie gemeinsam unterhalten, als wichtigen Kontext für gemeinsame Erfahrungen nutzen. Das soziale Netzwerk älterer Erwachsener umfasst durchschnittlich weniger periphere Bekanntschaften als bei jüngeren Erwachsenen (Lang & Carstensen, 1994; 2002). Daher könnte ein besonders kleines soziales Netzwerk bei älteren Erwachsenen ein Indikator dafür sein, dass die Partner häufiger exklusiv dyadische Interaktionen erleben und ihr Interaktionsstil daher weniger häufig durch die Anwesenheit Dritter beeinflusst wird. Im Sinne der SOK-Theorie (P. B. Baltes & Baltes, 1990) könnte dies zu verstärkter selektiver Optimierung der partnerschaftlichen Interaktionen führen.

Zusätzlich zeigte sich bei jüngeren Personen (aber nicht bei älteren Personen) ein Zusammenhang mit der Beziehungsdauer der Paare: Je länger die Partnerschaft jüngerer Paare bestand, desto größer war der Leistungsvorteil bei der Arbeit mit dem bekannten Partner im Vergleich zum unbekannten Partner. Dieser Zusammenhang lag an zwei Faktoren: Im Vergleich zu jungen Erwachsenen mit kürzerer Beziehungsdauer erzielten junge Erwachsene mit längerer Beziehungsdauer eine bessere Leistung mit ihren Ehe- oder Lebenspartner, und zweitens zeigten sie eine schlechtere Leistung mit dem fremden Interaktionspartner. Dieses Befundmuster legt die Vermutung nahe, dass interaktive Expertise besonders in früheren Phasen der Partnerschaft entwickelt wird. Allerdings könnten wichtige Aspekte interaktiver Expertise auch in Phasen der Beziehung ausgebildet werden, welche nicht durch die vorliegende Stichprobe abgebildet wurden, die nur Paare mit relativ kurzen und sehr langen Partnerschaften umfasste. Auch könnte die Substichprobe jüngerer Paare mit längerer Beziehungsdauer durch Selektionsprozesse besonders homogen in Bezug auf bestimmte individuelle oder dyadische Merkmale sein. Diese könnten zum einen das Aufrechterhalten der Beziehung begünstigen, und zum anderen die Leistung in der experimentellen Aufgabe beeinflussen.

Forschungsfrage 2 betraf den Effekt der Nutzung dyadisch geteilten Wissens auf die Leistung bekannter Partner. *Hypothese 2.1* wurde teilweise bestätigt: Je mehr dyadisch geteiltes Wissen ältere Personen nutzten, um ihrem Ehe- oder Lebenspartner die Zielbegriffe zu erklären, desto weniger Wörter benötigten sie (d.h., desto besser war ihre Leistung). Dieser Effekt fand sich jedoch nicht für die Substichprobe der jüngeren Paare. Konform mit *Hypothese 2.2* war der positive Effekt der Nutzung dyadisch geteilten Wissens auf die Leistung bei älteren Personen signifikant stärker als bei jüngeren Personen. In Folgeanalysen wurde dieser altersdifferentielle Effekt der Nutzung dyadisch geteilten Wissens auf die Leistung detaillierter untersucht. Dabei zeigte sich kein Zusammenhang des altersdifferentiellen Befundes mit kognitiv-mechanischen

Fähigkeiten. Eine alternative Erklärung des altersdifferentiellen Nutzens betrifft die unterschiedlichen Sprachstile jüngerer und älterer Teilnehmer: ältere Personen benötigten insgesamt deutlich mehr Wörter für die Aufgabe als jüngere. Daher könnte ihr Sprachstil sensitiver auf die Nutzung dyadisch geteilten Wissens reagieren. Dieser Idee folgend, berücksichtigten zusätzliche Folgeanalysen die Schwierigkeit der Zielbegriffe, welche für jeden Begriff empirisch ermittelt wurde durch die Anzahl benötigter erklärender Wörter in der Gesamtstichprobe (einschließlich jüngerer und älterer Teilnehmer sowie einschließlich bekannter Paare und unbekannter Dyaden). Diese Analysen zeigten, dass die Leistung jüngerer Erwachsener ebenfalls von der Nutzung dyadisch geteilten Wissens profitierte, wenn sie schwierigere Zielbegriffe erklärten. Dies unterstreicht das Potenzial dyadisch geteilten Wissens als Kompensationsstrategie: Altersunabhängig verbesserte diese Erklärungsstrategie die Leistung, sofern die Teilnehmer eine schwierige Aufgabe bewältigen mussten. Zusätzlich profitierten ältere Erwachsene, deren Leistungsniveau generell niedriger war als das jüngerer Erwachsener, insgesamt mehr von der Nutzung dyadisch geteilten Wissens.

Das gewählte experimentelle Paradigma wurde in Hinblick auf seine ökologische Validität mit dem Ziel entwickelt, eine alltägliche Kommunikationsaufgabe zu simulieren. Dieser experimentelle Ansatz impliziert jedoch Grenzen der Generalisierbarkeit. Ergebnisse, die durch Erhebungen im Alltagskontext gewonnen werden, könnten von den berichteten Befunden abweichen. Auch könnte zukünftige Forschung davon profitieren, (a) alternative Stichproben mit zusätzlichen Altersgruppen oder altersheterogenen Dyaden zu berücksichtigen und (b) die prozessorale Dynamik der Entstehung und Wirkung von interaktiver Expertise und dyadisch geteiltem Wissen zu untersuchen.

Insgesamt stützen die Befunde der vorliegenden Studie die Annahme, dass die Erfahrung früherer Interaktionen mit einem bekannten Partner und die daraus resultierende interaktive Expertise die Zusammenarbeit an einer kognitiven Aufgabe erleichtert. Die Befunde unterstreichen zusätzlich den besonderen Nutzen interaktiver Expertise bei der Kompensation alterskorrelierter Verluste in kognitiv-mechanischen Fähigkeiten. Als spezielle Facette interaktiver Expertise untersuchte die vorliegende Studie darüber hinaus die Nutzung dyadisch geteilten Wissens zwischen bekannten Partnern. Von dieser kommunikativen Strategie profitierten ältere Paare mehr als jüngere Paare. Es zeigte sich zudem, dass dyadisch geteiltes Wissens auch jüngere Erwachsene in ihrer Leistung unterstützen kann, wenn sie schwierige Aufgaben bewältigen müssen. Dies legt die Vermutung nahe, dass die Nutzung dyadisch geteilten Wissens eine generell nützliche Strategie für die Kompensation von Leistungsdefiziten ist, welche sich aber besonders im Kontext alterskorrelierter Verluste anbietet.

LIST OF TABLES

LIST OF FIGURES

LIST OF TABLES IN APPENDIX

LEBENSLAUF ANTJE RAUERS

Mein Lebenslauf wird aus datenschutzrechtlichen Gründen nicht online veröffentlicht

Erklärung

Hiermit versichere ich, dass ich die vorliegende Dissertation auf der Grundlage der angegebenen Hilfsmittel und Hilfen eigenständig verfasst habe. Die Dissertation war und ist nicht Gegenstand anderer akademischer Prüfungen.

Berlin, im Oktober, 2008

Antje Rauers