

largely experiential in nature and can be modified by modest intervention efforts.

Intelligence in the Everyday World

Attention has turned to the question of how traditional measures of intelligence relate to performance in real-life circumstances. Measures of so-called practical intelligence often appear to assess situation-specific competence rather than basic components of intelligence that would be widely generalizable. For an examination of practical intelligence from various points of view, see Schaie and Willis (1999).

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See also

Abilities

Competence

INTERFERENCE

Interference is a generic term used to describe the disruptive effects of three sources of irrelevant information: concurrent distractors, currently irrelevant memories, and strong but situationally inappropriate responses. All three sources tend to slow correct responding and reduce accuracy. In general, older adults are more susceptible than young adults to each source of interference (Hasher, Zacks, & May, 1999; McDowd, Oseas-Kreger, & Filion, 1995).

Older adults' vulnerability to interference from environmental *distraction* can be seen in visual search, categorization, problem-solving, and reading tasks. When searching for a target in a visual display, the presence of distractors impairs older adults more than it does young adults (e.g., LePage, Stuss, & Richer, 1999). Age differences in errors or slowing will increase with the number of distractors (e.g., Scialfa, Esau, & Joffe, 1998), unless targets and distractors are easily distinguished (e.g., Zeef, Sonke, Kok, Buiten, & Kenemans, 1996) or occur in predictable locations (see Madden & Plude, 1993, for sparing factors).

Age differences in distractor interference are particularly large if the distractors are related to the targets. For example, older adults' reading times are slowed more than those of young adults by distracting words scattered throughout a passage of text (Dywan & Murphy, 1996), and older but not younger adults are further slowed if distractors have meanings related to the passage. In some cases, distractors strongly related to the target can lead to age differences even if they appear in predictable locations. For example, older adults are more affected than younger adults by the nature of distractors in the Remote Associations Test, which asks participants to find the connection between three words (e.g., ship, outer, crawl: SPACE). Distractor words congruent with the solution (e.g., rocket, atmosphere, attic) result in greater benefits for older adults than for young adults, and incongruent distractors (e.g., ocean, inner, floor) result in greater costs (May, 1999). Both younger and older adults are slower to identify the category a word belongs to if that word is flanked by distractors from a different category than if it is flanked by distractors from the same category, but this difference is especially large for older adults (Shaw, 1991). In short, interference from distractors will have a greater impact on older adults' ability to identify and use target information than on that of younger adults. Exceptions occur only when distractors are very distinct from targets.

Interference from distractors (here, irrelevant material that is similar to the target) will also differentially impair the ability of older adults to retrieve a target memory. The irrelevant information may have been learned before (*proactive interference* [PI]) or after (*retroactive interference* [RI]) the targeted information. For example, if a friend moves and changes phone numbers, it may be difficult at first to remember the correct phone number because the memory for the old number gets in the way. Conversely, after the new phone number is well learned, it may be more difficult to remember the previous number.

Interference in *memory* is traditionally studied by using lists of unrelated word pairs in which one element arbitrarily serves as the cue (stimulus) for recall of the other (response). At test, participants are given one of these words (the stimulus word) and asked to remember the other (the response word). Interference can be created by pairing the

stimulus word with additional response words in a list presented either before (PI) or after (RI) the to-be-remembered list.

A review of earlier work using this methodology confirms that older adults are more susceptible than young adults to both PI and RI (see Kane & Hasher, 1995). The few exceptions can generally be explained by differences in materials or methodology. These differences include floor effects and the use of list lengths, numbers of lists, or memory measures insensitive to age differences or "young" samples that were actually middle-aged. Proactive interference has also been studied by using other procedures (e.g., Brown-Peterson, release from PI). Here the findings are more mixed, with some investigations finding greater decrements for older adults, and others finding no age differences. Again, the lack of age differences in some studies may be due to methodology: Kane and Hasher (1995) found that those studies that did not show age differences used, on average, many more lists (25.1 lists) than studies that did (7.0 lists). They suggest that the use of many lists may have caused PI to build up for both young and older adults, making age differences difficult to discern.

Although few recent studies have directly addressed the issue of age differences in either PI or RI, they generally support the idea that older adults are more susceptible to both (e.g., LePage, Stuss, & Richer, 1999; May, Hasher, & Kane, 1999). Other studies have found age differences in the major mechanism underlying interference, competition between to-be-remembered information and similar but incorrect information. This type of competition can be investigated by varying the number of items associated with a memory cue. Increasing the number of items associated with a cue makes retrieval of any one of those items slower and more error-prone (Anderson, 1983). For example, learning three facts about an object (e.g., "The potted palm is in the lobby," "The potted palm is in the laundromat," "The potted palm is in the stairwell") makes retrieval of any one fact about that object more difficult than if only one fact is learned about an object (e.g., "The pay phone is in the hall"). The increase in difficulty as more facts "fan off" a single cue and compete with each other at retrieval is referred to as the fan effect. Older adults show larger fan effects than do young adults (Radvansky, Zacks, & Hasher, 1996). However, presenting mul-

multiple pieces of information in a way that allows their integration into a single scene (e.g., "The potted palm is in the hotel lobby," "The pay phone is in the hotel lobby," "The wastebasket is in the hotel lobby") eliminates competition and thus fan effects for both younger and older adults.

Older adults show greater competition from irrelevant information even when explicitly instructed to forget such information, as in directed forgetting studies. Successful directed forgetting is demonstrated by lower memory for "forget" items and greater memory for "remember" items, compared to conditions in which all studied items are to be remembered. Relative to younger adults, older adults remember more "forget" items as a proportion of the total number of items recalled and are more likely to intrude "forget" items when trying to recall "remember" words (Zacks, Radvansky, & Hasher, 1996).

Older adults are also more vulnerable to interference from previously learned behaviors. Interference of this sort is often assessed by the Stroop Test or the Wisconsin Card Sort Test (WCST). Interference in Stroop is measured by comparing the time needed to name the ink color of incompatible color words (e.g., green ink used to spell the word *red*) to that needed to name the ink color of simple stimuli (e.g., colored blocks). Participants must overcome a strong word-reading tendency in order to name the color; interference from the word information results in slower and more inaccurate naming than in the simple condition. Stroop interference is typically greater for older adults than for young adults (e.g., Comalli, Wapner, & Werner, 1962). In the WCST, participants match response cards to key cards on the basis of one of three dimensions (color, shape, or number); the dimension to be sorted on changes without warning after 10 correct trials. Older adults are more likely than young adults to persist in a previously correct but now incorrect response rule (e.g., Kramer, Humphrey, Larish, Logan, & Strayer, 1994). Similarly, older adults have difficulty withholding a category decision when, on rare occasion, a signal sounds to do so (May & Hasher, 1998).

In general, then, older adults are more vulnerable than young adults to interference from concurrent distractors, from currently irrelevant memories, and from strong but inappropriate habitual responses. Age differences in interference proneness may con-

tribute to age differences on many tasks, including those measuring working memory (May, Hasher, & Kane, 1999; McDowd, Oseas-Kreger, & Filion, 1995). In some cases, reducing the role of interference in a task can reduce or even eliminate age differences in performance (e.g., May et al., 1999; Radvansky, Zacks, & Hasher, 1996). Finally, recent work has shown that some age differences in interference can be exaggerated when participants are tested in the afternoon, rather than the morning, a finding tied to age differences in circadian arousal (May, 1999).

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See also

Cognitive Processes

Learning

Memory and Memory Theory

INTERGENERATIONAL RELATIONSHIPS

Much research in aging focuses on the relationships and interactions among people of different ages or in different age groups. *Intergenerational* relationships are between family members in a lineage—parents and children, grandparents and grandchildren—interacting at the microsocial level. Intergenerational family relations typically reflect varying degrees of solidarity, conflict, ambivalence, and ambiguity.

Solidarity refers to the positive dimensions of sentiment, interaction, and cohesion in intergenerational relations between parents and children or grandparents and grandchildren (Bengtson & Schrader, 1982). Solidarity encompasses six components: (1) *affectual solidarity*, the sentiments and emotional evaluations of a relationship with a parent, child, or grandparent; (2) *associational solidarity*, the type and frequency of interaction between two family members of different generations; (3) *consensual solidarity*, how closely the generations within a family agree on values, opinions, and orientations; (4) *functional solidarity*, the exchange of material and instrumental support and assistance between generations; (5) *normative solidarity*, the

shared expectations about intergenerational support and filial obligations; and (6) *structural solidarity*, the opportunities the generations have for interaction based on the number, gender, and geographic proximity of intergenerational family members.

Research on solidarity indicates that strong emotional and instrumental bonds connect the generations of contemporary American families. Rather than either being very close or distant, families vary considerably. Silverstein and Bengtson (1997) find five general types of relationships between adult children and their parents: (1) tight-knit, where children engage with parents on all six dimensions of solidarity; (2) sociable, with interaction, proximity, shared values, and closeness but not exchange and support; (3) obligatory, including frequent contact, proximity, and exchange of assistance, but relations lack closeness and shared values; (4) intimate but distant, characterized by closeness and shared values but without proximity, frequent contact, or exchange of assistance; and (5) detached, as children and parents are not engaged on any dimension of solidarity.

Intergenerational solidarity has positive consequences for both younger and older generations. Positive memories of early-childhood relationships with their parents are associated with greater concern and support for aging parents by adult children (Silverstein, Parrott, & Bengtson, 1995). Aging parents' solidarity with adult children also enhances well-being and decreases their mortality risks (Wang, Silverstein, & Bengtson, 1999). In addition, the greater economic security of today's aging cohorts makes it possible for older family members to provide instrumental support to younger family members in need. These new links may strengthen older adults' roles within the family while bolstering the younger generation and family cohesion (Kohli, 1999).

Because conflict is a common element of human interaction, conflict is often a part of family life. Disagreement, competition, and conflict can coexist with order, stability, and cooperation within the family and between generations (Bengtson, Rosenthal, & Burton, 1996). *Conflict* encompasses: (1) the collision of individuals' agendas and interests, (2) tactics or responses to the clash of interests, or (3) hostility toward others (Straus, 1979). The frequency and degree of intergenerational disagreements, arguments, tension, criticism, and/or vio-

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