Memory for faces and names has increasingly become a focus of cognitive assessment and research in Alzheimer’s disease (AD). This paper reviews evidence from cognitive and clinical neuroscience regarding the question of whether AD is associated with a specific deficit in face recognition, face-name association, and retrieval of semantic information and names. Cognitive approaches conceptualizing face recognition and face-name association have revealed that, compared to other types of visual stimuli, faces are “special” because of their complexity and high intraclass similarity, and because their association with proper names is arbitrary and unique. Neuroimaging has revealed that due to this particular status, face perception requires a complex interplay of highly specialized secondary visual areas located in the occipitotemporal cortex with a widely distributed system of cortical areas subserving further task-dependent processing. Our review of clinical research suggests that AD-related deficits in face recognition are primarily due to mnemonic rather than perceptual deficits. Memory for previously studied or famous faces is closely related to mediotemporal and temporocortical brain regions subserving episodic and semantic memory in general, suggesting that AD-related impairments in this domain are due to neural degeneration in these areas. Despite limited specificity due to the apparent absence of a “genuine” domain-specific deficit of face memory in AD, testing memory for faces and names is useful in clinical contexts, as it provides highly sensitive indices of episodic and semantic memory performance. Therefore, clinical assessment of face memory can usefully contribute to early detection of memory deficits in prodromal and initial stages of AD, and represents a basis for further attempts at rehabilitation. Further advantages, such as ecological validity, high task comprehensibility and, in the case of novel face learning, independence from premorbid intelligence level, render measures of face recognition valuable for clinical assessment in early AD.

**Key words:** Alzheimer’s disease, faces, face recognition, naming, mediotemporal cortex, Alzheimer diagnosis, memory

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1Initial interview of Auguste D. by Dr Alois Alzheimer. Source: Patient record, Hospital for the Mentally Ill and Epileptics, Frankfurt am Main (Germany), November 26th, 1901 (cited in Maurer et al., 1997).
representations (‘face recognition units’), allowing for a familiarity judgment. If the face is considered familiar, semantic information is accessed, finally followed by retrieval and generation of the person’s name.

The sequential character of the Bruce and Young (1986) model provides an explanation as to why recognizing a person as familiar is much easier than identifying her, and why name recall, requiring successful processing in all preceding stages, is usually considered as most difficult (c.f., Figure 1). Later connectionist extensions have modified the model by postulating parallel retrieval processes for semantic information and names which were assumed to be stored in different but overlapping neural networks (Burton et al., 1990). In a connectionist view, the retrieval of proper names is assumed to be particularly difficult because their associations with the assigned subject are arbitrary and unique (c.f., Semenza et al., 1998). Thus, the neural connectivity of proper names is weaker than that of other concrete nouns, which usually refer to a whole class of objects.

The question of whether cognitive processing of faces is fundamentally different from processing of other classes of visual objects is a matter of ongoing debate, which has prompted a large number of electrophysiological and imaging studies (for a more extensive review, see Posamentier and Abdi, 2003). As human faces undoubtedly belong to the most important socio-emotional signals in everyday life, it appears reasonable that the human brain has in the course of evolution developed a specialized device for the detection and analysis of faces. Supporting this hypothesis, imaging research has identified activity in a circumscribed occipitotemporal brain area, the fusiform gyrus, as closely related to processing of faces in contrast to common objects (Kanwisher et al., 1997). Correspondingly, the investigation of evoked brain potentials has identified a negativity directly following the visuoperceptual P100 component, termed the N170 component, as a correlate of structural encoding of faces (Bentin et al., 1996; Eimer, 2000). Whereas these findings support the presence of domain-specific face processing (Carmel and Bentin, 2002; Kanwisher, 2000), others have argued that the fusiform face area is not exclusively related to face processing, but to subordinate-level visual processing automated by expertise. Activation of the fusiform gyrus and the occurrence of an N170 component could also be demonstrated for other classes of visual stimuli, given sufficiently high perceptual intraclass similarity and expertise of the spectator (Rossion et al., 2002; Tarr and Gauthier, 2000). Taking a third and conceptually intermediate position, Haxby and colleagues (Haxby et al., 2001; Ishai et al., 2000) reported different, but partly overlapping, patterns of activation in occipital and fusiform brain areas elicited by various stimulus categories of similar intraclass similarity (faces, houses, chairs). Integrating the findings from previous neuroimaging research, Haxby et al. (2000) proposed a distributed neural system for face perception, involving on the one hand the interplay of highly specialized fusiform brain areas located with the primary visual cortex, and on the other hand projections to widely distributed brain areas subserving further task-dependent face processing.

Fig. 1 – Schematic illustration of the sequential face recognition model developed by Bruce and Young (1986). Alzheimer’s disease initially affects level 3, with subsequent progression to level 2, while level 1 is spared until the severe stage of dementia.
such as the amygdala for processing facial emotion, or the anterior temporal cortex for name retrieval.

Regarding the central question of whether faces are fundamentally different from other types of stimuli, one might conclude that faces are indeed a special class of visual stimuli requiring highly specialized secondary visual brain areas located in the fusiform gyrus and widely distributed neural systems. In humans, this system is predominantly involved in face recognition, yet seemingly not predetermined or strictly confined to facial stimuli. It may therefore, given constant practice, also subserve the identification of idiosyncratic exemplars from other classes of highly similar, complex visual objects.

In AD, cortical degeneration in primary and secondary visual brain areas affects the perception of visual stimuli (Jackson and Owsley, 2003). However, compared to other classes of complex visual stimuli, face perception is not disproportionately affected by the disease. On the contrary, Becker et al. (1995) reported that in matching tasks, visual discrimination was better preserved for faces than for visual objects, a finding which was interpreted as evidence for the high subjective significance of memory for faces. Likewise, Hodges et al. (1993) found visuoperceptual discrimination of faces to be neither the sole nor the most important predictor of face recognition in AD. Further, there is no evidence for impaired derivation of viewpoint-invariant face representations as conceptualized in the Bruce and Young (1986) model. This is in contrast to face recognition deficits in prosopagnosia, which are due to impaired integration of single facial features at this early stage (Eimer and McCarthy, 1999; Schweinberger et al., 1995). As a caveat, there may be a subgroup of AD patients with visuoperceptual deficits; this ability should be assessed before concluding on a memory deficit.

Nevertheless, the process crucially affected in mild AD is access to person-related information and names, while familiarity judgments are consistently better preserved (Greene and Hodges, 1996a, 1996b). Within the framework of the Bruce and Young (1986) model schematically illustrated in Figure 1, this finding suggests that the activation of stored representations can still be accomplished in mild AD, but the neural connections between these units, the “person identity nodes” and names are affected by neurodegeneration. As the disease progresses, stored representations of individual faces (face recognition units – FRUs) become increasingly inaccessible, as evidenced by failure to recognize a previously-encountered face as familiar.

The relationship between semantic identification and name retrieval, which are the final steps in the face recognition models outlined above, has been controversially discussed, and the pattern of memory impairments in AD patients has served as an argument in this controversy. Based on the assumption that names and semantic information are kept in different stores (Burton et al., 1990), it was suggested that naming can bypass the retrieval of semantic information (Valentine and Holls, 1998). This “naming without semantics” hypothesis was supported by a number of case studies reporting correct name retrieval in the presence of only rudimentary semantic knowledge about celebrities in AD patients (e.g., Brennen et al., 1996; Kremin et al., 1994). However, in AD patients, a broad body of evidence has been accumulated that argues against a strict dissociation of naming and semantic knowledge, showing that correct naming of personally familiar or famous persons never occurs in the absence of semantic knowledge about the person (Hodges et al., 1993; Hodges and Greene, 1998; Bäckman and Herlitz, 1990; Lipinska et al., 1992). On the contrary, people with AD had more difficulty recalling a person’s name than recalling semantic information such as the person’s profession or the context in which s/he was previously encountered; this pattern is similar to that seen in older controls. Additionally, longitudinal analyses have indicated that deficits in name retrieval are seemingly secondary to the progressive semantic memory deficit in AD (Greene and Hodges, 1996b; Westmacott et al., 2004).

Research on the specific nature of face recognition deficits in AD has several implications for the Bruce and Young (1986) model. First, the hierarchical distinction between matching of actual and stored face recognition units and access to person identity nodes is confirmed by the finding of preserved familiarity judgments despite impaired recall of names or semantic information in mild AD. Second, Burton et al.’s (1990) extension of the model is supported. Whereas, in the original formulation of the model, access to person-related information and to names was assumed to form two separate sequential stages, the above-cited studies in AD patients suggest that these processes are subprocesses of semantic retrieval, which vary in difficulty (c.f., Figure 1).

**Brain Systems Subserving Memory for Faces and Names**

According to the widely-accepted conceptualization of memory outlined by Tulving (1972), memory for newly-learned faces and face-name associations is an episodic memory capacity, whereas recognition, identification and naming of famous or personally familiar faces is a function of semantic memory. Although episodic and semantic memory systems are not strictly separated, since episodic representations are transferred into semantic memory through constant repetition over time (Cermak, 1984), both areas will be reviewed separately here, because access to stored episodic and semantic memory might elicit different patterns of brain activation.
Functional neuroimaging in healthy participants has revealed that encoding and recognizing novel faces and names is associated with brain activity in the mediotemporal cortex. Several imaging studies in healthy subjects have shown that encoding of face-name associations engages a hippocampal-prefrontal network (Herholz et al., 2001; Sperling et al., 2001). Hippocampal activation during encoding predicts subsequent memory performance (Sperling et al., 2003b). Evidence regarding brain activation during subsequent recognition of newly learned faces is somewhat heterogeneous, with recent functional magnetic resonance imaging (fMRI) studies reporting hippocampal activation (Dickerson et al., 2005; Pariente et al., 2005) while earlier studies did not (e.g., Haxby et al., 1996; Leveroni et al., 2000). Frontal activation has been found both during encoding and during recognition of newly learned faces (Haxby et al., 1996; Kelley et al., 1998).

In early AD, hippocampal and parahippocampal atrophy as revealed by volumetry in structural MR scans was recently shown to be related to poor learning of novel face-name associations (Dickerson et al., 2005). Correspondingly, functional imaging in AD patients has revealed hippocampal hypoactivation during encoding of face-name pairs (Pariente et al., 2005; Sperling et al., 2003a). Notably, several studies have also provided evidence for compensatory brain activation during face-name encoding. Dickerson et al. (2005) reported increased hippocampal activity despite comparable hippocampal volume in patients with mild cognitive impairment (MCI) as compared to controls. This putatively compensatory hyperactivity in patients with memory deficits not yet fulfilling AD criteria clearly distinguished this group from AD patients who exhibited hippocampal atrophy and hippocampal hypoactivity while performing the task. In AD patients, hyperactivity was reported for frontoparietal (Pariente et al., 2005) and medial parietal (Sperling et al., 2003a) brain regions, and interpreted as evidence for compensatory activation of an alternative neural network. During successful recognition of newly-learned faces, Pariente et al. (2005) showed for AD patients compared to controls reduced activation of the right hippocampus and increased activation of inferior frontal and inferior parietal areas. A similar global pattern of hypo- and hyperactivation had already been demonstrated by an earlier positron emission tomography (PET) study (Bäckman et al., 1999), although verbal recall was assessed here and frontal hyperactivity was located more ventrally and medially.

Famous face recognition as a subdomain of semantic memory has been investigated in several imaging studies over the past 15 years. Studies addressing the recognition, semantic classification, and naming of publicly-known personalities in healthy participants have revealed that hippocampal and parahippocampal areas seem to play an important role even here. Comparing semantic categorisation of familiar faces and gender classification of unfamiliar faces, a PET study by Sergent et al. (1992) found increased activation in the right parahippocampus and in the anterior temporal cortex including the temporal poles bilaterally. Using a similar paradigm, Kapur et al. (1995) reported significant activation of hippocampal and parahippocampal as well as superior temporal areas, although only in the left hemisphere. Activity in the mediotemporal cortex, but also in lateral temporal areas, temporoparietal junction and middle frontal gyri was demonstrated in a PET study comparing brain activity related to famous versus novel faces during a same-different matching task (Gorno Tempini et al., 1998). Notably, no clear indication for hemispheric asymmetry was found in this study, whereas a simultaneously published clinical study indicated that semantic memory deficits were specifically related to left-sided temporal atrophy in patients with semantic dementia (Hodges and Graham, 1998). In a study directly comparing recognition of newly-learned faces and famous faces, Leveroni et al. (2000) found bilateral inferior parietal and right parietal areas to be activated when contrasting newly learned and famous faces. The opposite contrast, considering famous face recognition as activation condition, revealed greater overall activation in frontal, parietal, and temporal regions, particularly in the middle and superior temporal lobe, similar to Gorno Tempini et al. (1998). However, Kapur et al. (1995) reported that only bilateral inferior parietal activations emerged from this contrast. The heterogeneity of these findings might be partly due to differences in task difficulty within and across studies, depending on the respective stimulus materials and encoding procedures employed.

Naming and retrieval of semantic information for famous faces has been found to be related to brain activity in the temporal poles (Damasio et al., 1996; Gorno Tempini et al., 1998). However, as revealed by Grabowski et al. (2001), activity in this brain area is not confined to face naming, but occurs also when participants are asked to name unique landmarks or buildings. Thus, instead of being face-specific, activation of the temporal pole is related to highly specific lexical retrieval. Thus, with regard to the debate about face recognition, faces are special even in this context as they represent highly similar, but idiosyncratic, stimuli, a status which can however also be achieved by other classes of visual objects.

Summarizing the above findings from neuroimaging research, the encoding of newly
learned faces involves a mediotemporal-prefrontal network that has been established to subserve episodic memory (for a review, see Davidson et al., 2006). Both recognition of newly-learned faces and recognition of famous faces is associated with activation of the hippocampal system. Identification of famous faces additionally involves the middle and superior temporal cortex as well as the inferior parietal cortex known to be related to semantic memory (c.f., Grossman et al., 1997). Retrieval of biographical information for famous faces elicits activity in the anterior temporal lobe, similar to lexical retrieval for other stimuli of comparable specificity. Taken together, memory for faces and person names is associated with the same brain areas as other memory domains, and there is no evidence for specific brain areas subserving “face memory”.

EPISODIC MEMORY FOR NEWLY LEARNED FACES IN AD

The preclinical and initial stages of AD are typically characterized by a progressive episodic memory deficit (for a review, see Collie and Maruff, 2000), which is closely related to the earliest detectable pathological changes in AD occurring in the hippocampal formation and entorhinal cortex, as evidenced by histopathological and volumetric research (e.g., Braak and Braak, 1996; Fox et al., 1999). Consequently, in the past few years, a large number of clinical studies have investigated episodic memory in AD, employing faces or face-name associations for the investigation of non-verbal or cross-modal memory performance, and a variety of clinical tests have been developed for standardized assessment of episodic memory for faces.

At this point, it is relevant to consider some issues which are important for clinical assessment. When assessing recall and recognition of faces and names, it should be noted that these abilities draw on a range of cognitive processes, including perception, attention, and language skills, as well as memory. Therefore, assessment of memory for faces and names will need to include a neuropsychological evaluation of the full range of processes putatively involved. It is possible to establish whether visuospatial face perception is in the normal range using the Benton Unfamiliar Face Matching task (Benton et al., 1983; c.f., Wilson et al., 1982). If these preconditions are taken into account, assessment of memory for newly-learned as well as famous faces offers a number of advantages for clinical practice, as it represents a task which is easy to understand and obviously relevant for everyday life.

One of the first studies investigating recognition of newly learned faces in AD was reported by Diesfeldt (1990), using the Warrington Recognition Memory Test (RMT; Warrington, 1985), in which 50 previously studied faces intermixed with 50 distractors have to be classified as old or new. Compared to controls, people with mild AD showed a reduced recognition rate for faces, and the face recognition subtest proved to be more sensitive than a parallel RMT subtest investigating word recognition, presumably due to increased difficulty (c.f., Moss et al., 1986). Superior sensitivity of the RMT face recognition subtest was also demonstrated in a later study investigating the discriminability of patients with MCI from cognitively unimpaired elderly participants by means of cognitive assessment (DesRosiers et al., 1995). Converging evidence comes from a study by Efklides et al. (2002) who compared healthy elderly participants with patients diagnosed with mild AD and reported that delayed face recognition assessed by the Rivermead Behavioral Memory Test (RBMT; Wilson et al., 1991) was among those memory measures that discriminated between the two groups. The RBMT involves encoding and subsequent old/new classification of 5 facial portraits, and is designed to identify the presence of significant memory problems. Where memory deficits are subtle, the RBMT extended version (RBMT-E, Wilson et al., 1999, employing 15 faces), or the RMT, might be more appropriate as a clinical measure.

Face-name association learning is also frequently included in assessment of episodic memory in early AD. It involves cross-modal paired associate learning, which has been shown to be exceptionally sensitive in the earliest stages of dementia (Fowler et al., 2002). In patients with MCI, paired associate learning has been shown to be predictive for later development of dementia (Swainson et al., 2001). Among the standardized memory tests, the RBMT investigates face-name association learning by presenting a single unfamiliar female portrait at the start of the test together with a first and family name (three portraits and names in the extended test version), and assessing delayed name recall as one of the final components of the test. If the name is not freely recalled, the initial letters are given as cues. Delayed face recognition and delayed name recall after 20 minutes were among the most sensitive subtests for detecting memory deficits in two independent studies using the standard version of the RBMT (Efklides et al., 2002; Kazui et al., 2005).

Face-name association learning was also assessed by Greene et al. (1996) using the Doors and People Test (DPT; Baddeley et al., 1994). In this test, participants are shown a set of four facial portraits, for each of which they are told an occupation and asked for the name in each case. Unless recall is perfect on the first trial, they are
given up to 2 more learning and test trials. A delayed test is given after an intervening recognition task, allowing an evaluation of forgetting. Greene et al. (1996) compared patients with early AD and healthy controls with respect to performance on the DPT, the Wechsler Memory Scale and the CERAD (Consortium to Establish a Registry in Alzheimer’s Disease) test battery, and found marked deficits on all three measures, leading to the conclusion that the episodic memory deficit in AD is general in nature. Notably, in patients with very mild and mild AD, the sensitivity of recall measures was not higher than the sensitivity of recognition tests, as indicated by similar relative forgetting rates. Although individuals varied in the relative degree of impairment in verbal and visual memory tests, no tendency for material-specificity emerged from the comparison of verbal and nonverbal memory tests.

**SEMANTIC MEMORY FOR FAMOUS FACES IN AD**

Although episodic memory deficits are the most prominent early signs of dementia, impairments on semantically related tests are common in putatively preclinical stages of AD (Vogel et al., 2005) and as AD progresses from the mild to moderate stage, deficits in semantic memory lead to increasing difficulties in communication and activities of daily living (Perry and Hodges, 2000). In patients with AD, impaired naming and identification of famous names has been shown to be related to the severity of neurodegeneration, evidenced by autopsy-confirmed density of neurofibrillary tangles in prefrontal and anterior cingulate cortex (Giannakopolous et al., 2000).

Memory for famous faces and names has frequently been used as a measure of mild semantic memory deficits. Difficulties in naming famous people increase in healthy aging but are more pronounced in early AD (Semenza et al., 2003). Numerous studies have demonstrated an AD-related deficit in naming and identifying famous persons from their faces (Beatty et al., 1988; Becker et al., 1995; Dopkins et al., 1997; Greene and Hodges, 1996a, 1996b; Hodges et al., 1993; Wilson et al., 1981), and a correlation between this ability and other verbal and nonverbal measures of semantic knowledge (Greene and Hodges, 1996a).

The ability to recognize publicly-known faces has been evaluated in several studies using specially-assembled sets of stimuli. As knowledge about famous personalities is culture-specific, a number of national variants have been developed (e.g., Bäckman et al., 1991; Semenza et al., 2003). As an example of this approach, Hodges and Ward (1989) selected a set of 50 famous faces, 10 from each of 5 decades. They found patients with AD to be impaired in famous face recognition, name recall, and recall of semantic information related to the presented faces. Using this test, Greene and Hodges (1996a) reported a significant correlation between semantic identification of faces and object naming and classification, and a deterioration of face identification at follow-up after one year. In contrast, no correlation was found with measures of autobiographical memory. Likewise, failure of lexical retrieval is unlikely to account for deficits in recognizing famous personalities, as the ability to identify famous people from names or facial portraits is comparable in mild to moderate AD (Dopkins et al., 1997; Greene and Hodges, 1996a). Taken together, these findings suggest that impaired knowledge of famous people is associated with a breakdown of the semantic memory system in general.

One advantage of assessing memory for famous persons is that this represents a more sensitive measure of deficits in mild and even preclinical AD than other semantic memory tests like object naming. Thompson et al. (2002) reported that patients with MCI already showed a selective loss of person knowledge. In this study, naming of famous faces was shown to be more predictive for developing AD than naming objects. The predictive value of famous face recognition was also demonstrated by a retrospective study of patients with MCI who had converted to AD (Esteves-Gonzales et al., 2004), and by a longitudinal study including very old participants who at a follow-up study after 3 years had either converted to AD or not (Small et al., 1997). However, high sensitivity of tests measuring memory for faces and names is not accompanied by equally high specificity. Several studies have demonstrated that a decline in recognition of unfamiliar faces and in face-name association learning is neither specific for AD nor for dementia, but also occurs in normal aging (Ferris et al., 1980). For example, DesRosiers et al. (1995) found that the ability of the Warrington RMT face subtest to distinguish between dementia and depression was surpassed by Kendrick’s Object Learning test. Kazui et al. (2005) found that in the RBMT specificity of face recognition for MCI compared to normal ageing was not superior to that of other RBMT subtests, such as route finding, visuospatial recall and story recall.

Assessment of memory for famous faces makes it possible to determine the temporal gradient of retrograde memory deficits in a standardized way, which may provide valuable information for individual diagnosis. Similar to other types of information, faces from remote decades were better recalled than faces of recent celebrities (Hodges and Ward, 1989; Greene and Hodges, 1996a; Bäckman et al., 1991). The occurrence of a temporal gradient may be restricted to mild AD, as no clear temporal gradient was detected in a study involving patients in moderate disease stages.
(Wilson et al., 1981). In a wider perspective, the possibility of determining the temporal gradient of retrograde memory deficits is a further advantage of assessing memory for faces and names in a clinical context. As conceptualized by the models of face recognition reviewed above, and as confirmed by our review of previous patient studies, familiarity judgments, identification, and naming of facial portraits represent tasks of increasing difficulty, and the pattern of performance in these tasks can provide a precise picture of a patient's actual degree of episodic and semantic memory impairment.

The assessment of a temporal gradient has also gained considerable interest in research addressing the issue of whether memory for famous faces incorporates episodic or semantic memory. Several studies have demonstrated that a similar temporally-graded remote memory loss for famous faces and person-related information to that seen in AD is also found in patients with Korsakoff's syndrome who do not suffer from significant deficits in other domains of semantic memory (Butters et al., 1987; Kopelman, 1989; Mair et al., 1979). These findings can be interpreted as suggesting an episodic memory component to famous face recognition. However, there is also evidence for an alternative explanation of the seemingly paradoxical phenomenon of a temporal gradient in patients with intact semantic memory. Korsakoff's patients show a deficit in systematically searching the semantic knowledge system, which may account for a disproportionate impairment in judging the temporal order of past events (for a review, see Verfaellie et al., 1990). This deficit may be more related to frontal lobe damage than to mediotemporal atrophy, and thus may be superimposed on the more prominent memory disorder (Squire et al., 1989). Some contribution of episodic memory impairment to temporally graded remote memory loss cannot be ruled out, however, as amnesic patients with circumscribed medial temporal lobe damage may show such a pattern (e.g., Salmon et al., 1988; Squire et al., 1989).

**CONCLUSION**

The purpose of the present paper was to examine recent evidence from cognitive and clinical neuroscience regarding the significance of impaired memory for faces and names in AD. Three main conclusions emerge from our review of cognitive, neuroimaging, and clinical research. Neuroimaging and cognitive research in healthy participants has clearly established that in comparison to other classes of stimuli, faces are "special" as they represent highly complex, cognitively as well as socially relevant stimuli characterized by high intraclass similarity. Additionally, the association of faces and names is cognitively challenging because of its uniqueness and arbitrariness. Neuroimaging indicates that presumably due to this particular status, face perception requires the interplay of highly specialized areas located in the occipitotemporal cortex, with a widely distributed system of cortical areas subserving further task-dependent processing.

Results of behavioral and neuroimaging research with people who have AD, however, provide no evidence for a genuine AD-related "face recognition deficit". Within and across individuals, failure to recognize faces in AD is closely related to episodic and semantic memory capacity in general, and is equally dependent on the integrity of mediotemporal and lateral temporal brain areas as well as their frontal and parietal projections. Deficits in recognizing and naming newly-learned faces are closely related to episodic memory capacity, whereas deficits in recognizing, identifying and naming famous faces seem to be rather related to semantic memory.

Our review of the literature indicates that assessment of memory for faces and names, despite limited specificity due to the fact that there is no domain-specific face memory deficit in AD, significantly contributes to the diagnosis of memory impairments. Face recognition and naming are characterized by increased difficulty compared to verbal recognition or other object recognition tasks, and thus provide highly sensitive indices of episodic and semantic memory performance. Therefore, clinical tests of memory for faces can contribute to early detection of memory deficits in prodromal and initial stages of AD. Further advantages arise from the high ecological validity of face recognition, rendering this type of task easy to comprehend, and ensuring a high level of compliance. Finally, as face-name association is frequently requested and subsequently included as an element of cognitive rehabilitation or cognitive training interventions (e.g., Clare et al., 1999, 2001, 2002; Davis et al., 2001; Loewenstein et al., 2004), assessment in this domain may serve as a baseline measure. Taken together, these advantages render measures of face recognition and face-name association valuable for clinical assessment in early AD.

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