

Social capabilities preserved in Alzheimer patients

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Abstract

Alzheimer patients in the early stage of the disease were asked to participate in the Dictator game, a game in which each subject has to decide how to allocate a certain amount of money between himself and another person. The game allows the experimenter to view the influence of social norms and preferences on the decision-making process. When the data from the experiment are compared with the results of an identical experiment involving two control groups with similar ages and social background, one group with Mild Cognitive Impairment patients, the other with healthy subjects, it appears that the results from the three groups are statistically undistinguishable. This is an indication that Stage I AD patients are as capable of making decisions involving social norms and preferences as any person of their age, and that whatever brain structures are affected by the disease, they do not include, at this stage, the neural basis of cooperation-enhancing social interactions.

Introduction

Alzheimer's disease (AD) is a neurodegenerative disorder that afflicts an increasing part of our ageing population. The progression from healthy ageing to Alzheimer's dementia occurs in a subtle and graded fashion for perhaps a decade or longer. So, individuals in the prodromal stage of pathology could often be inadvertently included in samples of apparently normal elderly subjects (see Hedden and Gabrieli 2004). However, behavioral measures of cognitive impairment can be used to predict progression from healthy ageing to Mild Cognitive Impairment (MCI) to Alzheimer's disease, so that

individuals with MCI can be selectively excluded on the basis of such performance.¹ Much progress has been made in characterizing the behavioral and neural changes, particularly in memory systems that are associated with advancing age. The AD diagnose is mainly based on standardized neuropsychological tests that explore the conservation of the higher functions. Specific attention is given to the evaluation of consciousness, language, visiospatial functions, memory, orientation, cognitive functions and thought. When properly applied, the neuropsychological exploration yields rates of above 80% correct diagnoses as assessed by necropsy. Neuroimaging methods are becoming more used as far as they can increase the rate up to 92-94% (Norberg (2001)).

Since Alzheimer's disease is a process that starts from slight, hard to diagnose cognitive impairments towards a broad, generalized state where it becomes difficult to separate primary signs from secondary, unspecific, consequences, it turns out that its early manifestations make AD a useful model to analyze the selective weakening of higher functions. Roughly, these early manifestations happen along Stage I (1-3 years evolution) of the illness (Reisberg, Ferris, DeLeon (1978) and Hughes Berg, Danzinger et al. (1982)), when the learning deficit predominates while other symptoms do not yet impair the patients' independent life. In fact, it seems that the earliest neuropsychological deficits in AD appear in short-term memory and in recent declarative episodic memory (Petersen, Smith, Waring, et al. (1999)). These deficits are the background of the typical anterograde amnesia characteristic of early AD, consisting of a clear limitation to learn new information, while keeping the capability to evoke old memories.

While early AD and MCI patients share a similar memory deficit, their different classification is based on the additional impairment of other cognitive functions in the AD patient. We can, therefore, separate three different groups of subjects (AD, MCI and control or healthy) that will behave differently to the extent that their decision-making relies on mental structures affected according to the differences described above.

¹ MCI designates an early, but abnormal, state of cognitive impairment (Petersen, R. C. (2004)). Phenomenologically, it is a transitional stage between normal ageing and dementia in which a patient presents memory complaints and poor performance on memory tasks, but does not meet the diagnostic criteria for Alzheimer's disease. In a sample of normal older adults, approximately 3–5% of individuals will develop MCI each year. There is increasing evidence that individuals with MCI have a greatly increased likelihood of progression to Alzheimer's disease, with an annual rate of progression of 10–15% (Heiden and Gabrielli (2004)). Nevertheless, MCI cannot be considered an early stage of AD.

Experience, beliefs, social norms, learning and memory seem to be central to many aspects of decision-making. We are interested in verifying experimentally whether AD patients in their first stage of the disease suffer from any “social memory” loss, meaning the loss of the capabilities that help regulate social interactions, like the capability of showing fairness and altruism, or of valuing one’s social standing, i.e., one’s reputation. Our conclusions could help clarify many legal tangles around individual responsibilities of AD patients in law suits involving money matters. They could also help relate the degeneration in some specific brain structures in AD patients with structures that are engaged in cooperative social interactions, the neural correlates of such cooperation enhancing social norms like fairness, altruism and reciprocity. In this sense, our observations could become a further element in the understanding of the neural basis of a distinguishing feature of the human species, namely cooperative collective action.

With this purpose, we had Stage I AD patients participating in Dictator games (see, e.g. Camerer (2003) for references for this game). In this game, one player -called the dictator- who receives an amount of money from the experimenter has to decide how much of this money goes to another player (typically an unknown person). This other player, called the receiver, can do nothing but accept the money. This game corresponds to the simplest decision making in the context of two-person bargaining, since no strategic consideration about the receiver’s reaction to the offer should influence the dictator’s decision². These games, in addition to lacking any strategic component, are well documented and simple to understand. Thus they represent a useful tool to test for “self-interested” or “other-regarding” behavior. Self interest is key in explaining individual decision making in economics. Conventional economic theory postulates that the maximization of his own earnings guides the behavior of homo oeconomicus. From this perspective, the dictator, in a Dictator game, should give nothing to the other person. But a naïve self-interest model has a difficult time explaining human cooperation or the evolution of social norms and institutions that enhance this cooperation. Other-regarding behavior (which in itself may evolve from a

² At the next level of complexity we would place the so-called Ultimatum game, in which the receiver can accept or reject the offer made by the sender. If he accepts, he receives the offer. If he rejects, both receive nothing. Here economic theory predicts that a self-interested player offers the smallest money unit, which is accepted by the self-interested receiver. However, actual data from a large body of experimental studies shows that the modal response, when the game is played by humans, is near or at the fifty-fifty split and that small money offers are typically rejected. Interesting to note, some non-human primates also respond negatively to unfair offers (Brosnan, S. F. and B. M. de Waal (2003)).

“fitness” maximizing behavior) must be invoked. This other regarding behavior may take different forms in different models, be it fairness (Fehr, E. and K. M. Schmidt (1999)), altruism (Andreoni, J. (1989)), indirect reciprocity (Panchanathan, K and R. Boyd (2004)), or reputation building (Fehr, E. (2004)), to name a few. The Dictator game, being devoid of any strategic element with respect to the other player - who in fact has no role to play in the game-displays the decisions involving a positive gift as other-regarding, or driven by cooperation-enhancing social norms and preferences (for references on social norms and preferences, see Camerer (2003)). By comparing the amount of giving by Stage I AD patients with the amount of giving of MCI and healthy subjects, we can establish the degree by which Stage I-AD patients keep intact the memories of these social norms and preferences.

Experiment design and procedure

Participants (subjects) were volunteers recruited by telephone by the staff of Hospital de Enfermos Crónicos in Alacant, Spain. They were asked to participate in a session where they would have to respond to “some mental exercises”. They were informed about the estimated duration of the exercises and told that no physical examination, or any type of medical procedure would be performed on them. There was no mention of any rewards involved.

As indicated above, we classified the subjects into three different groups, depending on whether they had been diagnosed with AD, MCI, or had no diagnose of mental impairment. The diagnoses were made following the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS, later NINDS) and Alzheimer’s Disease and Related Disorders Association (ADRDA; McKhann et al., 1984) criteria. Patients with other neurological, metabolic and psychiatric pathologies were excluded. All the patients recruited received a complete neurological and neuropsychological evaluation. According to Petersen et al. (1999), “the primary distinction between control subjects and subjects with MCI [is] in the area of memory, while other cognitive functions [are] comparable. However, when the subjects with MCI [are] compared with the patients with very mild AD, memory performance [is] similar, but patients with AD [are] more impaired in other cognitive domains as well.”

The criteria established by NINCDS-ADRDA for labelling a patient as AD is to find at least one more impaired function (apart from memory) of the so called cognitive functions (aphasia, apraxia, agnosia, and executive functions). When only one of these functions is affected the patient is classified as mild or Stage I.

Specifically the three groups were:

- The *AD group*, made up of hospital outpatients who had been diagnosed, or re-diagnosed, in the previous six months, and were in the initial stage of their disease or in Stage I (Reisberg et al. (1982) and Hughes et al. (1982))
- The *MCI patients* had also been diagnosed, or re-diagnosed, in the previous six months.
- For the *C group*, the control, we invited subjects without mental impairments. The subjects in this group had similar ages and social background as the members of the other two groups. Two types of subjects compose this group. One type corresponds to family or help of a hospital patient (in many cases of an AD outpatient). The other type corresponds to volunteers from a State Center for old people.

Subjects were overwhelmingly working class, with few years of schooling. For a detailed account see Table A1 in the Appendix. A summary appears in Table 1 below.

Subject pool	Number of subjects	Males	Average age
AD	23	14	76.7
MCI	15	6	73.6
CONTROL	25 (12 patient related)	15	70.2

Table 1: Characteristics of the three subject pools

Participants were led in groups of 2 to 8 into the experimental room, located in the grounds of the hospital³. They were placed behind cardboard screens to protect their privacy, were provided with an envelope and given a present of ten 1€ coins in each treatment.⁴ Instructions were read aloud. The instructions described the receiver and asked participants to place inside the envelope any number of coins that they may want to allocate to the receiver, while keeping their share in their pockets or purse. At the end of a treatment one of the experimenters collected the envelopes. Note that the word dictator was never mentioned.

Subjects were told that their names would not be revealed. However, in order to avoid a degree of complexity that might not be easily handled by the AD subjects, we decided against using a full-anonymity procedure, like the double-anonymous procedure of Hoffman et al (1994), or any other complex procedure. As a result, the procedure involving the collection of envelopes, while done away from other subject's view, could not prevent the experimenter from guessing, if willing, by the envelope's weight and bulge, what each particular subject had offered.

The differences between the three treatments were:

- In the first treatment, the *Anonymous* treatment, the receiver was described as an anonymous person, "like yourselves", located in another room of the building.
- In the second treatment, the *Two-way identification* treatment, the receiver was a person of the same sex and similar age, who entered the room where the experiment was taking place, and was introduced as the receiver to the dictator.

The intention of the visual recognition procedure was to turn the faceless subjects into full-fledge human beings.

³ The experiments took place in two separate dates, in Sept 2003 and in Jan 2004. In September we had sessions with groups of 2 subjects with AD, groups of 4 subjects with MCI and groups of 8 Control subjects. We had decided to experiment with small AD groups since we did not know whether AD patients would need more attention from the experimenters. Since this was not the case, we decided to have larger groups in the January sessions. In these sessions, the experimenters did not know to which specific groups the different subjects participating in the same session belonged.

⁴ In the double blind treatments of the Dictator game run in America (where anonymity versus other participants *and* the experimenter was preserved) dollar bills were used (Hoffmann et al (1996) and Eckel and Grossman (1996)). Unfortunately no 1€ paper bills, much easier to conceal in an envelope, exist. Frey and Bonet (1995) also use coins in their experiments.

- In the third treatment, called the *Red Cross* treatment, the receiver was identified as the Red Cross (see C. Eckel and P. Grossman (1996) for a Dictator experiment with a Red Cross receiver).

Each subject participated in all three treatments. The procedure started with the Anonymous treatment. As soon as it was over, the instructions for the Two-way identification treatment were read, the receivers were asked into the room and they were introduced without mentioning any names to the dictators. After this, the receivers were escorted out the room and the dictators made their decisions. Finally, instructions for the Red Cross treatment were read and, after the envelopes for this last treatment were collected, the participants were dismissed.

Results

As shown in the three figures in Figure 1, our data indicate:

Observation 1. *Within each of our three treatments, the amounts given by the control, MCI and AD groups are undistinguishable (see Figure 1a-c).*

No conventional tests can reject the null-hypothesis of equal behavior between the different groups within the same treatment.

Observation 2. *In all groups, the visual contact with the receiver (the Two-way identity treatment) did not change the pattern of giving, when compared with the Anonymous treatment.*

To the participants in this experiment, it appears that a stranger is a stranger whether they see him/her or not. This may indicate that, as it is the case with healthy participants, Stage I AD patients can form abstract images of other persons and can relate to them as they would relate to visually-contacted persons.

Observation 3. *In all groups, there is a significant increase in giving when the receiver becomes the Red Cross.*

The increase in giving to the Red Cross is statistically significant (at the 5% level, using Kolmogorov-Smirnov one-sample test), comparing the percentage of giving between 0-5 Euros in the first two treatments with the Red Cross treatment. Specifically, 48% of subjects in the AD group, 58% in the MCI, and 44% in the control group increased their share of giving when we compare the Two-way identity treatment with the Red Cross treatment. The increase can also be characterized as economically significant.

The more generous allocations to the Red Cross seem to indicate similar awareness of social context in all three groups. Specifically, the variation in the behavior of the AD subjects, as the “social distance” decreased, is undistinguishable from the variation of behavior in both the MCI patients and the Control patients. Social distance can be defined as the degree of reciprocity that subjects believe exists within a social interaction (Hoffman, McCabe, Shachat and Smith 1996),

In summary, the decisions made by the group of AD patients are undistinguishable from the decisions of the MCI and healthy participants.

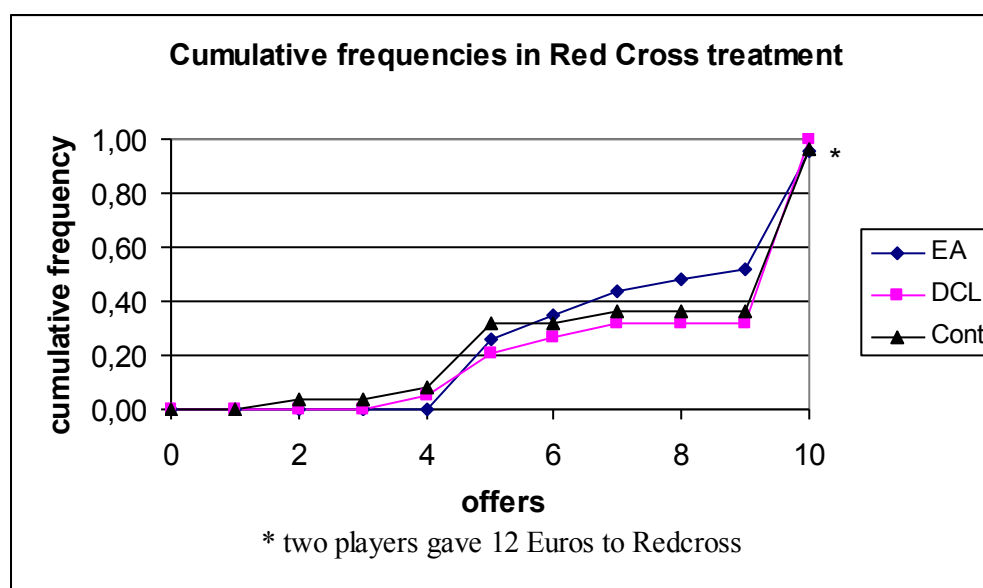
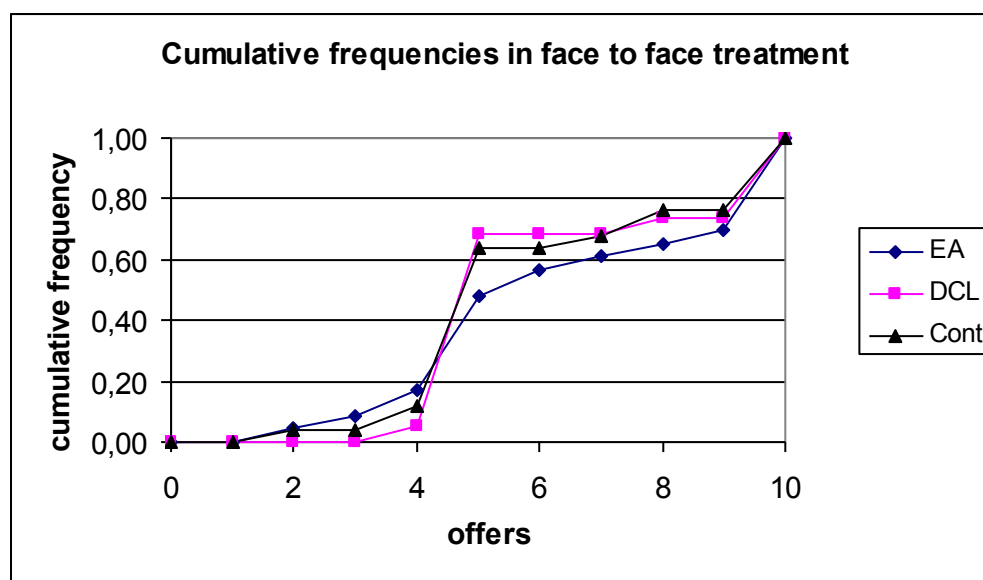
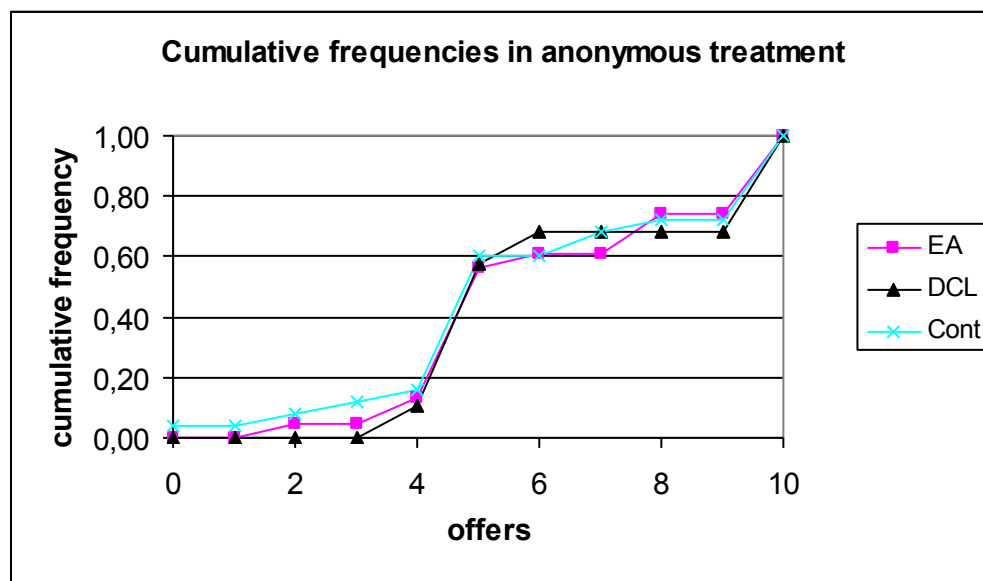


Figure 1 a-c. Cumulative frequency of giving (out of 10 Euros), for each treatment and subject pool.

Discussion

It is well known that Dictator experiments are quite sensitive to design details. In our experiment subjects gave more than in most previously reported Dictator experiments. The average amounts given in our treatments by the three groups appear in Table 2.

	Anonymous receiver	Two-way identity	Red Cross
AD	6.52 (6.17)	6.69 (7.04)	8.04 (5.5)
MCI	6.59 (5.92)	6.42 (5.37)	8.52 (5.26)
Control	6.44 (8.02)	6.48 (5.81)	8.24 (7.58)

Table 2. Average giving, out of 10 Euros, in the different groups and treatments (variance in parenthesis.)

These results show offers above what had been observed in Bohnet and Frey (1995) (1999) or Eckel and Grossman (1996), as shown in Table 3. These experiments had recruited their subjects in the manner usual in economic experiments, i.e., by placing advertisements asking for volunteers and promising the possibility of earning a significant amount of money for participating. But, as reported in Eckel and Grossman (2000), large behavior differences occur when subjects are, instead, “corralled” to participate. In this latter paper, the authors compare the results in Dictator games with student volunteers recruited in the usual manner and with pseudo-volunteers⁵. In the second case, contributions are 22 to 50 percent higher. In particular, while in the volunteer sessions that they run only 5.2 percent of decisions gave everything to charity, in pseudo-volunteer sessions, 28,7 percent of decisions gave everything to charity. It appears that the subjects in the last group are motivated by “something other than the

⁵ Pseudo-volunteers were recruited from a class in which the experiment was to be conducted immediately, during the class period. Participation was still voluntary: students were told they could choose not to participate and leave without penalty.

incentive structure built into the experimental design”, which is another way of saying that self-interest does not drive their decisions. Since the participants in our experiment were closer to pseudo-volunteers than genuine volunteers, this helps to explain some of the differences between our results and previous studies.

Furthermore, in our experiments there is no difference between the Anonymous treatment and the Two way identification treatment. This is in contrast to Frey and Bohnet (1999), who find that giving is significantly increased from one to the other treatment as can be seen in Table 3, where equal split offers increase from 25% to 71%. But Frey and Bohnet had a between-group design in contrast to our within-group design. Another explanation of the similar level of giving between the two treatments might simply be that most of our subjects gave half or more in the anonymous treatment, which was already very generous.

	Anonymous receiver (Bohnet&Frey 1995, 1999)	Two way identification (Bohnet&Frey 1995, 1999)	Red Cross (Eckel &Grossman 1996) (Double blind)	Anonymous receiver (this study)	Two way ident. (this study)	Red cross (this study)
0 offers	28%	0%	27%	1%	0%	0%
Equal division	25%	71%	17%	45%	48%	22%
Above equal split offers	0%	11%	15%	41%	40%	71%
Average offer	26%	50%	31%	64%	64%	82%

Table 3. Percentage of giving in the studies by Bohnet and Frey (1995, 1999), Eckel and Grossman (1996) and in our three treatment (pooled over all three subject pools).

But other factors may be also influencing the more generous performance. Age may be one of them.⁶ Another may be social background. And one should not disregard the effect of the participant's surprise at a procedure, carried out in the hospital, which resulted in them earning some money. As a matter of fact, a number of subjects mentioned that they had no entitlement to the experimental money; that they had not earned it and therefore did not deserve to take it with them. The money being "manna from the experimental heaven", they could not possibly justify it in front of husband or wife⁷.

But the important point is that, whatever the factors that contributed to the generosity of participants, these factors did *not* have a differential impact on the three groups of subjects, whether AD, MCI or controls. Recall that the three groups were recruited identically, all had the same social background and age, all were confronted with an identical decision carrying the same rewards, and the sessions were run in the same hospital environment. Subjects only differed in their cognitive capabilities. At this stage, it may be worth recalling that MCI patients meet criteria that differentiate them from healthy control subjects and from those with Stage I AD. In other words, MCI patients constitute a clinical entity that can be specifically characterized (Petersen, R. C., G. E. Smith, et al. (1999)). Consequently, the groups defined in the study should be considered internally consistent and clinically distinguishable from each other.

Because AD patients have impaired short-term memory, the three treatments that we performed on them turn out to be independent of each other, as the time delays between treatments were long enough to erase memories from their just-made decisions. The same cannot be said of the control and MCI groups. Yet, the way decisions evolved in these two groups, as we moved from one treatment to another, is undistinguishable from the evolution of the decisions of AD patients. This suggests that learning within the experiments played no role in the subjects' decision-making. Or, to put it

⁶ Fehr et al. (2003), Bellemare and Kroeger (2003) and Sutter and Kocher (2003) find that the degree of reciprocity (measured by the returns in trust games) are significantly higher with increasing age. On the other hand, Berg et al. (1995) and Kovalchik et al (2004), who test confidence, gambling, the endowment effect, and the theory of mind (strategic thinking) find that "the older adults' decision behavior is similar to that of young adults, contrary to the notion that economic decision making is impaired with age."

⁷ "I don't want the money", "It is not mine", "I get enough with my pension", "I have enough to get by", "I make enough money", "I'm not that kind of person", are comments by two AD patients who refused to take the money with them. Another AD patient felt that she had to justify why she kept some money. She claimed, when talking to the experimenter after the session, that she needed the money, that she was "illiterate" and that the money can come handy (she split the money 5, 6 and 5 for the receiver). Finally, one participant in the control group insisted on returning the money earned during the experiment.

differently, that all subjects' decisions were based on experiences and social norms and preferences brought into the lab from the outside world.

Our results may be unexpected since AD patients show significant cognitive deficits. They have significantly lower scores in the Moral Judgment Interview, and obtain significantly less earnings in the Card Test when compared to a normal control group (Torralva, T., F. Dorrego, et al. (2000)). They also show significant difficulties in numerical tasks embedded in an everyday context, such as handling money (Martini, L., F. Domahs, et al. (2003)).

That Stage I AD subjects perform like control and MCI subjects suggests that at this early stage of the illness, evolution of the neural circuitry responsible for social capabilities still remains sufficiently conserved and that, at least, the operational subset of such circuitry is capable of maintaining social behavior. This seems to be in accordance with the observation that a broad range of complex cognitive abilities is preserved in patients, with dementia of the Alzheimer type, who cannot perform simpler actions (Beatty, W. W., P. Winn, et al. (1994)).

Conclusions

The results of the experiment show that, in the Dictator game, there is no difference in performance between the Stage-I AD patients and the MCI and control groups. All three groups of participants perform alike albeit all three groups give more than in most previous Dictator games. Several factors could explain this generous behavior. The interesting point is that, whatever these factors, the AD subjects are affected by them exactly in the same way as the Control and MCI subjects. Moreover, like non-diseased subjects, AD subjects gave more generously as the receiver went from anonymous or visually-contacted receiver, to a well-known charity.

This experiment allows us to conclude that the memory deficit that characterizes AD patients does not affect their performances in the Dictator game. This is in agreement with our present understanding of AD, which in general accepts that the lesions begin to appear at the temporal level, mainly in the hippocampus. The involvement of the hippocampus in memory has been extensively checked (Nordberg (2001)) On the other hand, the structures involved in decision-making are mainly located in the prefrontal cortex, which is affected in more evolved stages of the disease but remains, apparently, unaffected at these early stages. Under this perspective, changes in performance when making decisions could be expected in subjects with

frontal pathologies (frontotemporal dementia, orbitofrontal lesions). In fact, some studies have shown a lack of anticipation of the negative consequences of their choices in patients with orbitofrontal cortical lesions (Reisberg et al. (1982)). Obviously, the results of submitting patients with frontotemporal dementia to Dictator experiments would be highly complementary with our results.

But even in the absence of such data, our results indicate that decision-making in the Dictator game is performed without the involvement of short-term memory. Paraphrasing Hoffman et al. 1996 (p. 655) we can say that if it is the *past* experiences that drive the participants' decisions, then Stage-I AD patients have not lost their memories of these experiences. If it is the *future* consequences of their decisions that shape them, then Stage-I AD patients have not lost their concern for how their decisions are going to be judged. Like non-diseased subjects, AD patients bring their experiences and reputations from the world into the experimental lab. And they bring them as healthy patients do.

In the light of these results one has to conclude that in the early stages of their disease, AD patients appear to value their social interactions as much as healthy patients do and are as susceptible, as healthy patients are, to the social emotions that mediate these interactions. To conclude, Stage I AD patients are as capable of making decisions involving social norms and preferences as any person of their age, and that whatever brain structures are affected by the disease, they do not include, at this stage, the neural basis of cooperation-enhancing social interactions.

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Appendix 1: Raw data.

	TIME	CODE	DIA	GEN	AGE	SCHOOLING LEVEL	JOB	LABORAL	EXP	EXP.	EXP
	GROUP		G.	DER			TYPE	ACTIVITY	1	2	3
									Offers		
September data		CÓDE		GEN			JOB	Laboral			
	DLC I			DER			TYPE	Activity			
	9:00	A1	DCL	F	69	Basic reading-writing		House lady	6	5	10
		A2	DCL	M	73	Elementary	CA	Baker	10	8	10
		A4	DCL	M	78	Can read and write	CA	Building worker	5	5	10
	DCL II										
	9:45	A5	DCL	M	66	High School	CA	Quality control Nuclear powerplants	5	5	10
		A6	DCL	F	72	Basic reading-writing		House lady	5	5	5
		A7	DCL	F	68	Can read and write	CA	Cleaning Service	5	5	10
		A8	DCL	M	68	Elementary	CA	Unskilled worker, shoe making	5	5	10
family a5		A9	DCL	M	79	Can read and write	CA	Farmer	10	10	10
	CONTROL	B1	control	F	60	Elementary		House lady	10	10	10

Family A6	10:30	B2	control	M	79	Can read and write	CA	Farmer	5	5	5
Family C1		B3	control	F	77	Can read and write		House lady	5	5	10
family A7		B4	control	M	69	Can read and write	CA	Unskilled factory worker	5	5	10
family A8		B5	control	F	67	Can read and write		House lady	5	10	10
family C2		B6	control	M	81	High School	CA	Accountant	10	10	10
family C3		B7	control	F	69	High School	CP	Small shop owner	5	5	5
		B8	control	M	79	Can read and write	CP	Fisherman	7	7	7
	EA I	C1	EA	M	80	Can read and write	CA	Porter	10	10	10
	11:15	C2	EA	F	79	Elementary		House lady	10	10	10
	EA II	C3	EA	M	71	Elementary	CP	Small shop owner	5	10	10
	12:00	C4	EA	F	79	Can read and write		House lady	4	3	6
	EA IV	C7	EA	F	81	Illiterate		House lady	5	6	5
	13:30	C8	EA	M	85	Elementary	CP	Porter	10	10	10
January data	9:30	1.1	DCL	F	73	Reading and writing Basic knowledge	CA	Cleaner	10	10	10
		1.2	DCL	M	72	Can read and write	CA	Building worker	4	5	5
		1.3	EA	M	71	Elementary	CA	Porter	8	9	10
RELATIVE 1.3	10:00	2.1	Control	F	69	Can read and write	CA	Tailor	10	10	10
RELATIVE 1.2		2.2	Control	F	72	Illiterate	CA	Peasant	10	8	12
		2.3	Control	M	65	Elementary	CA	Lorry driver	7	8	5

WORKER'S
RELATIVE

10:30	3.1	Control	F	80	Can read and write	CP	Fishing entrepreneur (2)	3	4	4
	3.2	Control	F	77	Can read and write	CP	Food shop owner	10	10	10
	3.3	Control	F	67	Elementary	CA	Cleaner	4	4	5
	3.4	Control	M	64	Elementary	CA	Garage manager	2	2	2
	3.5	Control	F	57	Elementary	CP	Office materials entrepreneur (11)	0	5	10
11:00	4.1	DCL later EA	F	81	Can read and write	CA	Cleaner	5	4	5
	4.2	DCL later EA	M	78	Elementary	CA	Sound technician RNE	10	10	10
	4.3	DCL	M	70	Illiterate	CA	Building worker	10	10	10
	4.4	DCL later EA	M	78	High School	CA	Building worker	4	4	5
11:30	5.2	EA	F	72	Elementary	CA	Seller of ONCE coupons	5	5	10
	5.3	EA	F	59	Elementary	CP	Independent cleaner	10	10	10
	5.4	EA	F	73	Illiterate	CA	Unskilled worker tobacco factory			
	5.5	EA	F	74	Can read and write	CA	Dressmaker	8	7	7

	12:00	6.1	DCL	M	89	Elementary	CA	Port docker	5	5	5
		6.2	DCL	F	70	Can read and write	CP	Independen t dressmaker	6	5	7
		6.3	DCL	M	70	Can read and write	CA	Miner	5	5	10
		6.4	DCL	F	79	Elementary	CP	Painter	10	10	10
RELATI VE 8.3	12:30	7.1	Cont	M	70	Elementary	CA	Hospital attendant	10	10	10
RELATI VE 8.2		7.2	Cont	F	65	Elementary	CA	Autobús attendant	5	5	10
RELATI VE 8.1		7.3	Cont	F	73	Elementary	CA	Nurse assistant	5	5	5
		7.4	Cont	M	73	High School	CP	Food commerciali zation entrepreneu r (7)	5	5	5
RELATI VE 8.1		7.5	Cont	M	79	Elementary	CA	Rail worker	8	5	10
RELATI VE 8.4		7.6; 5.4	EA	F	73	Illiterate	CA	Unskilled worker tobacco factory	5	5	5
	13:00	8.1	EA	F	80	High School	CA	Nurse	5	5	10
		8.2	EA	M	71	Elementary	CA	Accountant	10	10	10
		8.3	EA	F	69	Elementary	CA	Nurse assistant	6	6	9
		8.4	EA	F	78	Can read and write	CA	Tailor	5	5	6
	17:00	9.1	DCL	M	63	High School	CP	Electric material entrepreneu r (25 empleados)	5	5	10
		9.2	DCL	M	83	Elementary	CP	Independen	5	5	6

							t cobbler			
	9.3	DCL	F	77	Can read and write	CA	Kitchen assistant	10	10	10
	9.4	DCL	M	79	Can read and write	CA	Peasant	5	5	4
	9.5	DCL	M	73	Can read and write	CA	Lorry driver	4	4	5
17:30	10.1	Cont rol	F	67	Can read and write	CP	Independen t embroiderer	5	5	10
	10.2	Cont rol	F	60	Can read and write	CP	Catering – hotel business entrepreneu r	5	5	10
	10.3	Cont rol	F	75	Can read and write	CA	Unskilled worker aluminium factory	10	5	10
	10.5	Cont rol	M	72	High School	CP	Decorator	5	5	10
18:00	11.1	EA	M	77	Elementary	CA	Wooden floor installer	8	8	12
	11.2	EA	F	84	Elementary	CP	Catering – hotel business entrepreneu r (6)	5	5	7
	11.3	EA	M	76	Elementary	CP	Garage entrepreneu r (3)	2	2	8
	11.4	EA	F	74	Can read and write	CP	Independen t cleaner	5	5	5

The following instructions were read aloud. The participants did not get a written version, since some of the subjects were illiterate. They have been translated from Spanish into English.

Instructions 1

Good Morning, thank you for participating in the exercise.

In this exercise, each person will be paired with another one located in another room. You don't know this person and he/she also doesn't know who you are. In addition, you will not meet each other.

Now we give to each of you 10 euros and an envelope. You are asked to decide how much of these 10 euros you would like to give to this person you don't know and how much you want to keep for yourself.

Put the euros you will give to the other person (if you will give some) inside the envelope. Keep the remaining euros for you in any place you prefer.

What you do is secret, nobody will know your decision. For this purpose we have placed you behind the cardboards.

There is no hurry, you have five minutes to decide.

Is there any doubt?

PAUSE

To be handled separately after the previous part is finished. The persons that make their appearances are dressed conventionally, are of the same sex as the patient and not too dissimilar in age.

Instructions 2

In the following exercise, each of you will be paired with a person that will enter the room for a moment so you can see him/her. (The paired persons enter and locate themselves by their subject's chair. The experimenter says "this is the person with

whom you are matched " and invites the subjects to look at each other; after a few seconds the experimenter says "thank you" and "you can go now", and they depart).

Now we give you ten euros and an envelope. You have now to decide how much of these 10 euros you would like to give to the person you just saw and how much you want to keep for yourself.

Put the euros you will give to the other person (if you will give some) inside the envelope. Keep the remaining euros for you in any place you prefer.

What you do is secret, nobody will know your decision. For this purpose we have placed you behind the cardboards.

There is no hurry, you have five minutes to decide.
Is there any doubt?

PAUSE

Instructions 3

Now we give you an envelope and 10 euros to be shared out with the Red Cross. You have now to decide how much of these 10 euros you keep for yourself, and how much you give to the Red Cross.

Put the euros you will give to the Red Cross (if you will give some) inside the envelope. Keep the remaining euros for you in any place you prefer.

What you do is secret, nobody will know your decision. For this purpose we have placed you behind the cardboards.

There is no hurry, you have five minutes to decide
Is there any doubt?