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Oncologists' non-verbal behavior and analog patients' recall of information

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ABSTRACT

Background Information in oncological consultations is often excessive. Those patients who better recall information are more satisfied, less anxious and more adherent. Optimal recall may be enhanced by the oncologist's non-verbal communication. We tested the influence of three non-verbal behaviors, i.e. eye contact, body posture and smiling, on patients' recall of information and perceived friendliness of the oncologist. Moreover, the influence of patient characteristics on recall was examined, both directly or as a moderator of non-verbal communication.

Material and methods Non-verbal communication of an oncologist was experimentally varied using video vignettes. In total 194 breast cancer patients/survivors and healthy women participated as 'analog patients', viewing a randomly selected video version while imagining themselves in the role of the patient. Directly after viewing, they evaluated the oncologist. From 24 to 48 hours later, participants' passive recall, i.e. recognition, and free recall of information provided by the oncologist were assessed.

Results Participants' recognition was higher if the oncologist maintained more consistent eye contact ($\beta = 0.17$). More eye contact and smiling led to a perception of the oncologist as more friendly. Body posture and smiling did not significantly influence recall. Older age predicted significantly worse recognition ($\beta = -0.28$) and free recall ($\beta = -0.34$) of information.

Conclusion Oncologists may be able to facilitate their patients' recall functioning through consistent eye contact. This seems particularly relevant for older patients, whose recall is significantly worse. These findings can be used in training, focused on how to maintain eye contact while managing computer tasks.

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In medical consultations, patients generally have to process a large amount of information. Especially in oncology, information is often elaborate and complex. Cancer patients need to remember and reproduce this information to prepare for and deal with their disease and treatment. However, this information may be threatening and, as a consequence, challenge patients' recall by increasing anxiety and inducing stress [1]. For example, talking about a cancer prognosis has previously been found to impair patients' overall recall [2]. Not surprisingly then, cancer patients remember only part of what they have been told: overall, approximately half of the information provided during the consultation can be reproduced by patients [2,3].

Physicians' non-verbal communication may be of significant importance to optimally support patients' recall of information. Non-verbal communication is all communication produced by something other than words [4]. To date, few studies empirically investigated how physicians' non-verbal

communication affects patients' recall. Results indicated that information provided by physicians who leaned more forward and gazed in the patient's direction is better understood and recalled [5]. Additionally, vocal variety (e.g. in pitch and speed) and hand gestures seem to enhance recall, possibly through a process of signposting, i.e. pointing the listener to key elements of the information [6]. Although these results suggest a relation between non-verbal communication and recall, it is unclear what causal mechanisms underlie this relation.

It has been suggested that physicians may improve patients' recall by conveying their information using non-verbal communication that induces positive affect [7,8]. Affective non-verbal communication may reduce patients' emotional arousal, allowing improved memory functioning [9]. Moderate levels of emotional arousal are presumably optimal for memory functioning, whereas excessive arousal impairs memory [10]. Affective non-verbal communication may be even more important for groups for whom recall is difficult to start with.

For example, older patients have more difficulty remembering relevant medical information [11], but their memory may benefit from information associated with positive affect and provided in a trustful environment [12]. Also, lower educated patients remember significantly less relevant information [13]. Finally, high anxiety levels are suggested to hamper information recall [13]. Communication inducing positive affect could reduce anxiety and hence, improve information storage and recall [14]. This may be particularly true for relational anxiety or attachment anxiety, which is patients' worry about the other person's availability in times of need [15]. As affective non-verbal communication is inherently relational, patients with high relational anxiety could benefit from it specifically.

In summary: 1) physicians' non-verbal communication may influence patients' recall by improving cognitive processing via positive affect; 2) patients' recall of information is expected to be worse for older, lower educated and more anxious patients; and 3) the strength of the relation between non-verbal communication and recall may depend on patient characteristics, specifically age and anxiety. We examined these effects in a breast cancer setting, where information is abundant and complex, and patients' stress is relatively high, and used an experimental design with video vignettes, to identify causal relations.

Material and methods

Design and experimental conditions

To investigate the effects of non-verbal behaviors in isolation, video vignettes were used, i.e. videotaped medical consultations based on scripts. This method prevents practical and ethical issues that would arise if communication were to be manipulated in clinical practice. Video vignettes have proven practical, feasible and externally valid [16].

The basic video vignette displayed a brief, 10-minute consultation between a medical oncologist and breast cancer patient about adjuvant chemotherapy following mastectomy. Trained actors played the roles of (male) oncologist and (female) patient. Next, three non-verbal behaviors by the oncologist were varied, i.e. *Eye contact*, *Body posture*, and *Smiling*. These behaviors were chosen because they have been described as conveying non-verbal immediacy, i.e. physical, temporal and psychological closeness [17]. We constructed two levels of each behavior:

- (1) Eye contact
 - (a) Consistent eye contact (EYECONT+): The oncologist retains the patient's gaze throughout the patient's speech and refrains from looking at the computer screen or paperwork while talking or listening.
 - (b) Inconsistent eye contact (EYECONT-): The oncologist frequently gazes at the computer screen or paperwork while the patient speaks or while providing information [18].
- (2) Body posture
 - (a) Forward leaning and frontal posture (BODY+): The oncologist is seated directly facing the patient, leaning slightly forward over the table.
 - (b) Varying posture (BODY-): The oncologist alternates between a forward leaning, patient-directed posture

and a backward leaning posture, leaning away at a 45° angle from the patient [19].

(3) Smiling

- (a) Occasional smiling (SMILING+): the oncologist smiles occasionally, especially in the first and final phases of the consultation which involve more social talk. Smiles are modest, conveying understanding or encouragement [20].
- (b) No smiling (SMILING-): the oncologist does not smile throughout the consultation.

The manipulations were combined in all possible ways, resulting in eight video variants, identical except for the manipulations (see Figure 1). Pilot testing was performed at multiple stages: first, on the basic script and second, on test-fragments of the video vignettes. Video development, pilot procedures and pilot results are elaborately described in Appendix A. Participants were randomized to view one video version each.

Subjects and procedure

Data for this study were collected in the context of a larger research project, investigating the influence of non-verbal communication on trust [21]. Women with a breast cancer diagnosis and healthy women of comparable age were recruited to participate as analog patients (APs), i.e. viewing the video while imagining themselves to be the patient [16]. Patients were recruited through cancer patient organizations (via e-mail) and through radiotherapy outpatient clinics of a regional and an academic hospital (via information letter distributed by the radiotherapist). Healthy women were recruited by asking participating patients to enrol a woman of their own approximate age.

After their initial recruitment, participants were further informed and asked informed consent by phone. Next, they received an e-mail with a link to the online experiment. Online, participants first completed a baseline survey about their socio-demographic and medical background (T0). Next, a randomly selected variant of the video was shown. Participants were instructed to play the video on full screen with full volume and to make sure they were not interrupted during viewing. They were instructed to imagine themselves being the patient in the video. After the video, a second survey asked participants how friendly they perceived the oncologist to be (T1). Other measures assessed at T1 are reported in Hillen et al. [21]. Afterwards, participants were asked permission to be contacted by phone one or two days after participation, for some final questions. They were telephoned 24–48 hours after viewing the video, for a recall assessment (T2).

Measures

Manipulation check (T1)

Single items assessed participants' perception of the oncologist's amount of eye contact, physical distance to the patient and attention to the patient (the latter two to assess body posture), and smiling (five-point Likert scale, *completely disagree*=1 to *completely agree*=5).

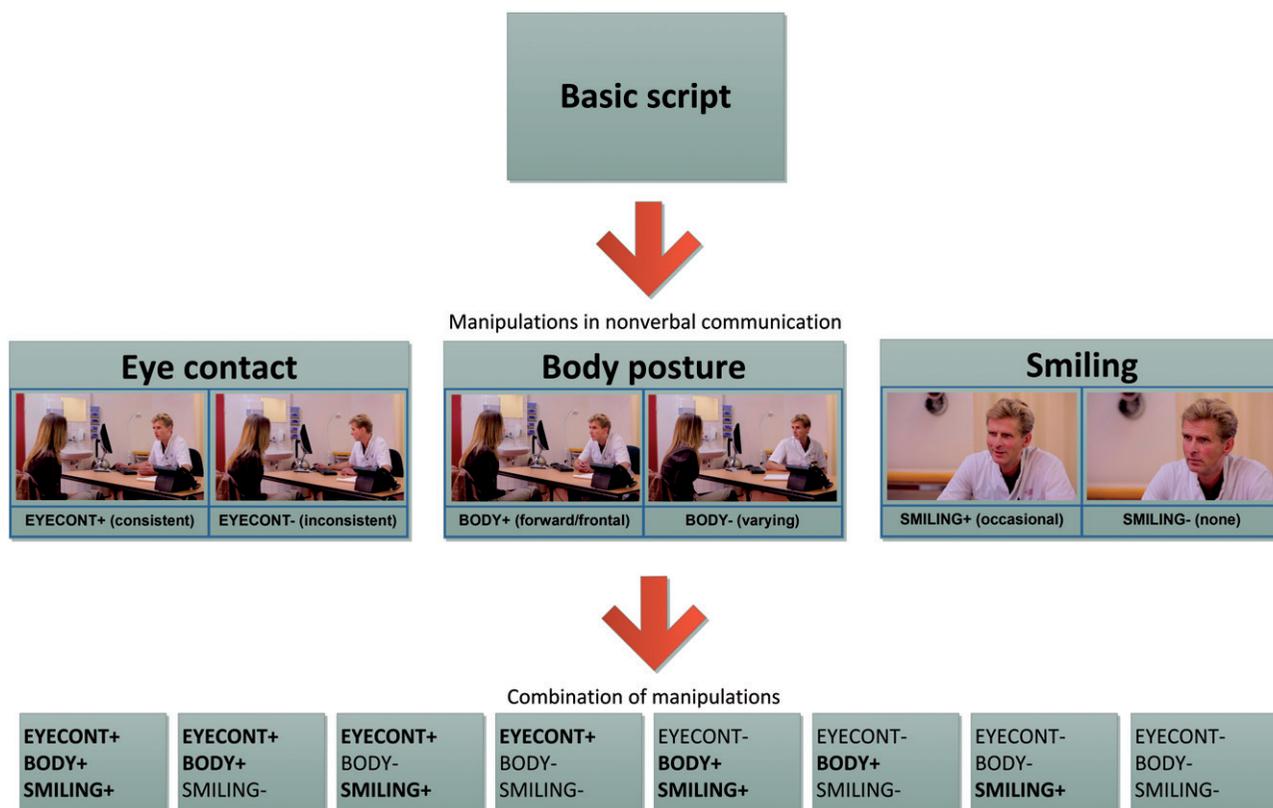


Figure 1. Visual illustration of the development of eight video versions.

Personal and medical characteristics (T0)

Socio-demographic characteristics assessed were age, education and ethnicity. Among patients, we additionally assessed treatment status and time since diagnosis. We measured relational anxiety using the attachment anxiety dimension (six items) of the *Experiences in Close Relationships short form* (ECR-sf; seven-point Likert scale, *completely disagree* = 1 to *completely agree* = 7) [22]. High attachment anxiety is associated with proximity seeking and worries about being abandoned. The scale was previously forward-backward translated into Dutch.

Primary outcome: Recall

Recall of the information conveyed by the oncologist was assessed using 10 questions about facts mentioned by the oncologist in the video [23]. To assess free recall, all items were first asked as open questions. Recognition was next assessed using the same questions in multiple choice format with three realistic answer options. The recall questionnaire was pilot tested among 10 healthy women, to check for comprehensibility and ceiling effects. This resulted only in slight changes to the phrasing of items. Two examples of items are 'The oncologist mentioned the chance that the disease would return after undergoing all proposed treatments. What was the percentage?' and 'How frequently did the oncologist say he would check up with the patient?' All items were scored as correct (1) or incorrect (0). Sum scores (range 1–10) for both free recall and recognition were calculated.

Secondary outcome: Affective perception of the oncologist

Participants assessed how friendly they perceived the oncologist to be, as an indicator of positive affect. A single item was used, i.e. 'I thought this oncologist was friendly' (five-point Likert scale, *completely disagree* = 1 to *completely agree* = 5).

Statistical analysis

All analyses were conducted using SPSS 20.0 (IBM Corp, New York, 2011). To test a total of 12 effects (three main effects of the communication manipulations, three main effects of patient characteristics, six interactions between communication manipulations and age/attachment anxiety on recall), using an alpha of .05, for a 95% power to detect medium-sized effects (Cohen's $F^2 = 0.15$), we would require at least 184 APs [38].

Stepwise linear regression analysis was used to test effects on recall, separately for free recall and for recognition. In the present analyses, we did not investigate differences between the two subgroups, i.e. data were taken together for patients and healthy women. Previous analyses showed comparable results between the two subgroups, justifying this decision [21]. Step 1 included the main effects of dichotomous communication manipulations (body posture, eye contact, and smiling); Step 2 added main effects of age, education level and attachment anxiety; Step 3 additionally included the moderating effects of age and attachment anxiety on communication manipulations. Next, to more specifically test for interactions between age and non-verbal communication, we split the sample into an older (>65 years) and younger age (<65 years)

group. Regression steps 1 and 2 were repeated for both groups separately, to examine whether main effects of non-verbal communication were particularly present in one subgroup. Similarly, steps 1 and 2 were repeated for the higher and lower anxiously attached groups separately, dichotomized around the median score. For regression analyzes, all variables were centralized around the mean (continuous variables) or scored as -0.5 versus 0.5 (dichotomous variables). 'Education level' was dichotomized as higher (college or university) or lower. Finally, we explored whether non-verbal communication influenced perceived friendliness of the observed oncologist, using *t*-tests. Post-hoc, we explored whether combining all three non-verbal manipulations enhanced recall, using a *t*-test to contrast patients' recall scores in the low immediacy video (all non-verbal behavior standard; $n = 28$) versus the high immediacy video (all three non-verbal behaviors enhanced; $n = 22$).

Results

Manipulation check

The oncologist was perceived as having significantly more eye contact in the EYECONT+ condition ($M = 3.78$, $SD = 0.92$) compared with the EYECONT- condition ($M = 3.15$, $SD = 1.10$, $p < 0.001$). The physical distance between patient and oncologist was perceived as slightly greater in the BODY- condition ($M = 3.51$, $SD = 1.05$) than in the BODY+ condition ($M = 3.22$, $SD = 1.06$; $p = 0.06$). Reported attention to the patient was higher in the BODY+ condition ($M = 2.84$, $SD = 1.13$) than in the BODY- condition ($M = 2.52$, $SD = 1.10$, $p < 0.05$). Patients in the SMILING+ condition reported that the oncologist smiled more ($M = 3.16$, $SD = 0.92$) than in the SMILING- condition ($M = 2.24$, $SD = 0.92$, $p < 0.001$). These results indicate that non-verbal communication was successfully manipulated.

Sample

Of the total sample of 248 participants in the larger study [21], 194 women (78%) consented to participate in recall testing (Table 1): 68% breast cancer patients or survivors (50% outpatients and 18% patient organization respondents) and 32% healthy women. Mean age was 54 years (range 31–85); 82%

were younger and 18% older than 65. Almost half were highly educated (46% college/university). Mean score for attachment anxiety was 2.67 ($SD = 1.04$, $Mn = 2.50$, range 1.00–6.33).

The impact of non-verbal communication by the oncologist

Mean percentage of correctly recalled information was 53% ($SD = 20$, range 0–100), and for recognition 85% ($SD = 14$, range 0–100). Eye contact did not significantly influence free recall ($\beta = 0.10$, $p = 0.15$) but did affect recognition ($\beta = 0.17$, $p = 0.02$; regression Step 2, Table II). Body posture influenced neither free recall ($\beta = 0.04$, $p = 0.55$) nor recognition ($\beta = -0.05$, $p = 0.50$). Similarly, the effects of smiling on free recall ($\beta = -0.00$, $p = 0.98$) and recognition ($\beta = -0.07$, $p = 0.33$) were non-significant. The oncologist in the EYECONT+ condition was perceived as more friendly ($M = 3.67$, $SD = 0.90$) than in the EYECONT- condition [$M = 3.34$, $SD = 0.94$, $t(157) = -2.28$, $p = 0.02$]. Similarly, scores for oncologist friendliness were higher in SMILING+ condition ($M = 3.75$, $SD = 0.81$) than in the SMILING- condition [$M = 3.26$, $SD = 0.99$, $t(157) = -3.38$, $p = 0.02$]. Body posture did not influence perceived friendliness.

Patients' background characteristics as predictors of recall

Older participants had worse free recall ($\beta = -0.34$, $p < 0.001$) and recognition scores ($\beta = -0.28$, $p < 0.001$; Model 2, Table II). Education level was not related to recall ($\beta = 0.05$, $p = 0.45$) or recognition ($\beta = 0.07$, $p = 0.32$). Attachment anxiety was not predictive of either free recall ($\beta = 0.01$, $p = 0.93$) or recognition ($\beta = 0.03$, $p = 0.70$).

The moderating effect of patients' background characteristics on the effect of non-verbal communication on recall

None of the interactions between non-verbal communication and age or attachment anxiety were significant for free recall or

Table 1. Demographic, health and relationship characteristics of the sample ($N = 194$).

	Breast cancer patients ($n = 132$)		Healthy women ($n = 62$)	
	Median (range)	SD	Median (range)	SD
Age ($N = 194$)	55 (31–91)	11	51 (31–73)	11
	<i>N</i>	%	<i>N</i>	%
Educational level ($N = 194$)				
None/Primary school	2	2	0	0
Secondary/Lower level vocat. school	72	55	30	48
College/University	58	44	32	52
Ethnicity ($N = 194$)				
Dutch	121	92	56	90
Other	11	8	6	10
Treatment status ($n = 132$)				
In active treatment	50	38		
Undergoing regular check ups	79	60		
No treatment or check ups	3	2		
	Mean (range)	SD		
Attachment anxiety ($n = 194$)	2.73 (1.00–6.33)	1.09	2.56 (1.00–5.33)	0.93
Number of months since diagnosis ($n = 132$)	43 (5–355)	48		

Table II. Stepwise regression of main and interaction effects of patients' socio-demographics, attachment anxiety and oncologists' non-verbal communication on free recall and recognition.

	Free recall				Recognition			
	<i>b</i>	SE <i>b</i>	β	<i>p</i>	<i>b</i>	SE <i>b</i>	β	<i>p</i>
Step 1								
Constant	-0.00	0.15			0.01	0.10		
Oncologist's eye contact	0.25	0.29	0.06	0.40	0.39	0.21	0.14	0.06
Oncologist's body posture	0.05	0.30	0.01	0.87	-0.21	0.21	-0.07	0.31
Oncologist's smiling	-0.02	0.29	-0.01	0.94	-0.20	0.21	-0.07	0.34
Step 2								
Constant	0.00	0.14			0.01	0.10		
Oncologist's eye contact	0.40	0.28	0.10	0.15	0.49	0.20	0.17	0.02
Oncologist's body posture	0.17	0.28	0.04	0.55	-0.13	0.20	-0.05	0.50
Oncologist's smiling	-0.01	0.28	-0.00	0.98	-0.20	0.20	-0.07	0.33
Age	-0.07	0.01	-0.34	<0.001	-0.04	0.01	-0.28	<0.001
Education	0.21	0.29	0.05	0.45	0.20	0.20	0.07	0.32
Attachment anxiety	0.01	0.14	0.01	0.93	0.04	0.10	0.03	0.70
Step 3								
Constant	0.02	0.14			0.01	0.10		
Oncologist's eye contact	0.40	0.29	0.10	0.17	0.46	0.20	0.16	0.03
Oncologist's body posture	0.18	0.29	0.05	0.53	-0.10	0.20	-0.04	0.62
Oncologist's smiling	0.00	0.29	0.00	0.99	-0.17	0.20	-0.06	0.41
Age	-0.06	0.01	-0.32	<0.001	-0.04	0.01	-0.27	0.001
Education	0.27	0.30	0.07	0.36	0.21	0.21	0.07	0.32
Attachment anxiety	0.02	0.14	0.01	0.90	0.03	0.10	0.02	0.80
Eye contact \times Age	-0.01	0.03	-0.03	0.71	0.02	0.02	0.07	0.36
Body posture \times Age	-0.04	0.03	-0.09	0.21	-0.01	0.02	-0.05	0.53
Interaction smiling \times Age	-0.01	0.03	-0.04	0.62	-0.03	0.02	-0.09	0.21
Eye contact \times Attachment anxiety	0.09	0.28	0.02	0.76	0.12	0.20	0.04	0.56
Body posture \times Attachment anxiety	-0.10	0.28	-0.02	0.74	-0.07	0.20	-0.03	0.73
Smiling \times Attachment anxiety	0.04	0.28	-0.01	0.88	0.07	0.20	0.03	0.72

Significance at:

* $p < 0.05$,** $p < 0.01$,*** $p < 0.001$. For free recall: $R^2 = 0.00$ for Step 1 ($p = 0.86$), $\Delta R^2 = 0.12$ for Step 2 ($p < 0.001$), $\Delta R^2 = 0.01$ for Step 3 ($p = 0.90$). For recognition: $R^2 = 0.03$ for Step 1 ($p = 0.14$), $\Delta R^2 = 0.09$ for Step 2 ($p < 0.001$), $\Delta R^2 = 0.02$ for Step 3 ($p = 0.80$).

for recognition (Table II). Similarly, repeating analyses of the main effects for old and young participants separately did not yield differences between subgroups in the strength of effects of non-verbal communication on recall. Separate regression analyses for patients with high versus low attachment anxiety, however, revealed that sustained eye contact enhanced recognition for higher anxious ($\beta = 0.22$, $p = 0.03$), but not for lower anxiously attached participants ($\beta = 0.13$, $p = 0.21$).

Post-hoc analyses

No significant differences were found in scores between the high and low immediacy videos for free recall [$t(48) = 0.52$, $p = 0.61$] or for recognition [$t(48) = -0.73$, $p = 0.47$].

Discussion

This is the first experimental study suggesting that eye contact by the oncologist may improve analog patients' recognition of information. This finding is important for medical practice and oncology specifically. With the presence of the computer and use of electronic medical files in almost every medical consultation room, maintaining real contact may become an evident challenge. Free recall was slightly, but not significantly enhanced by consistent eye contact. Possibly, eye contact affects memory functioning gradually: its effect on multiple choice questions (assessing recognition) may be stronger than on open questions (assessing free recall), because the former require less elaborate cognitive processes. [24]. This hypothesis

should be further investigated in future experimental and observational studies assessing the effects of eye contact on both recognition and free recall.

Possibly, eye contact functions as a form of minimal encouragement to patients, supporting their engagement in the consultation. Likewise, minimal encouragement by nurses, e.g. using silence or using prompts like 'mmm', led to better recall by patients [11]. Similarly, sustained eye contact prompts patients to pay more attention to the oncologist's information. Increased attention can promote storage and, ultimately, reproduction of information [25]. Reduced stress may also account for the effect of sustained eye contact on recognition, as suggested by the enhanced effect of eye contact on recognition among anxiously attached women, who were previously found to experience increased stress and fear of abandonment. To them, sustained eye contact may have a comforting effect, reassuring that they can continue to rely upon the oncologist. This could in turn reduce their stress levels to enable more optimal memory functioning [10].

In the current study, consistent eye contact as well as smiling enhanced analog patients' perception of the oncologist's friendliness. This finding is in line with previous observational studies [26], and supports the notion that the patient-provider relationship can be enhanced by the oncologists' non-verbal behavior. Information recall was worse for older women. Considering that presently, the majority of cancer patients is 65 years or older, this result is worrying. Efforts need to be made to facilitate memory functioning in

this group. Contrary to our expectations, using non-verbal behaviors displaying immediacy did not specifically support older women's memory. Although this may have been due to the relatively small group of analog patients aged >65 years in our sample, more specific non-verbal behaviors enhancing immediacy may need to be identified [27].

The lack of impact of body posture and smiling on recall, suggests that these behaviors do not affect memory functioning. Possibly, recall is influenced only by the combination of non-verbal cues signifying immediacy, instead of the individual behaviors [25]. However, post-hoc analyses revealed no effect of multiple non-verbal behaviors combined on recall. It should be acknowledged that the variations in smiling and body posture may have been too subtle. A manipulation check indicated that the variations in communication were only subtly perceived, specifically for body posture. Also, for body posture, the lack of effect may be explained by analog patients' expectations. Within most Dutch outpatient settings, physicians' body posture is rather static, because of the presence of a table between physician and patient. Consequently, patients may not expect the physician to display substantial variation in body posture, and thus pay less attention to it.

Some limitations of this study need to be mentioned. First, findings of studies using video vignettes and analog patients should be interpreted with caution. Despite substantial evidence that this design is externally valid, further study is necessary before findings can be extrapolated to clinical practice. The preliminary findings of the present experimental study should be corroborated using observational studies in actual clinical encounters. Second, we manipulated non-verbal behaviors in isolation, to allow studying the individual impact of these elements. Although this enabled us to draw causal conclusions about observed effects, it does limit ecological validity. In reality, non-verbal behaviors do not occur in isolation, but are naturally entwined with both each other and with verbal communication. Future studies combining experimental findings with clinical observational data on the relation between eye contact and recall, could produce more robust and externally applicable conclusions. Finally, this study included only women. It should be replicated in a male or mixed sample to draw any conclusions about the generalizability of these effects. Women have previously been found to gaze more than men, especially in close interactions [28]. Consequently, women may perceive and process eye contact differently than men.

To conclude, our results suggest that by maintaining eye contact, physicians may not only be perceived as friendlier, but might also facilitate passive information recall. Older women, for whom recall was found to be worse, may be particularly vulnerable to these effects. For these patients, strategies to enhance recall may be even more important. The present findings raise consciousness among physicians about the impact of their non-verbal behavior on recall, particularly among older people. Moreover, they can be used in training medical professionals and students, to maintain sufficient eye contact in addition to performing the necessary computer tasks. This strategy aids optimal communication between physicians and patients and, ultimately, may lead to improved patient care.

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Compliance with ethical standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The hospital's Medical Ethics Committee provided an exemption for this study to seek formal approval (W2013_070). The study was registered with the Dutch Trial Registry, with number NTR3934. Informed consent was obtained from all individual participants included in the study.

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Appendix A

“Does oncologists’ non-verbal expression of immediacy influence patients’ recall of information?”

Video vignettes development

This appendix was published as supplementary material previously in *Breast Cancer Research and Treatment*, at http://static-content.springer.com/esm/art%3A10.1007%2Fs10549-015-3486-0/MediaObjects/10549_2015_3486_MOESM1_ESM.pdf

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Creation of the basic script

The basic script was based on audiotaped and videotaped consultations about adjuvant chemotherapy for breast cancer ($n=6$). Whereas such consultations normally last between 15 and 60 minutes, we shortened our script to last no more than 10 minutes. This was because scripting a longer consultation would be practically difficult, and would moreover make our manipulations less impactful. The scripted consultation involves a 49-year-old female breast cancer patient and a 44-year-old male medical oncologist, meeting for the first time after the patient has undergone conservative breast surgery. The oncologist summarizes the patient’s history, explains the tumor characteristics, associated risks and prognosis (using a computer program) and proposes a treatment plan involving chemotherapy as well as hormonal therapy. Subsequently, he discusses the chemotherapy procedure, side effects and risks. He does not discuss hormonal therapy in detail. At the end of the consultation, the patient is provided the opportunity to ask questions.

Validation, stage 1

To assess validity of the basic script, two medical oncologists, four researchers of medical communication, one movie director and three patients with breast cancer commented upon the script’s credibility, fluidity, accurateness of medical content and realism. The most important subsequent changes made to the script were:

- (1) The consultation was more explicitly introduced at the start, to help viewers’ engagement in the story;
- (2) The questions asked by the patient were kept simpler;
- (3) More pauses were explicitly written in the script, to slow down the pace of the consultation.

Development of manipulations

Apart from the manipulations, the scripts were kept identical across conditions. We selected three behaviors described in the literature on non-verbal communication in medical settings, which have previously been most frequently linked to trust in the physician. Non-verbal variations in the basic script were created for the oncologist’s: (1) amount of eye contact; (2) body posture; and (3) amount of smiling. Operationalizations were based on previous literature on the effects of non-verbal communication, and on observation of earlier videotaped recordings of introductory radiotherapy consultations [29], in which we assessed the naturally occurring variation in non-verbal behaviors within a Dutch radiotherapy setting. These consultations strongly resemble the introductory consultation in a medical oncology setting, with regard to structure and duration. We used behavioral coding software, i.e. The Observer [30], to time-stamp behavioral events within the recordings of radiotherapy consultations. For eye contact, we documented the percentage of the consult in which eye contact between physician and patient took place. For body posture, we assessed variation in and duration (in seconds) of body postures, specifically forward/backward leaning and orientation. For smiling, we assessed the range in frequency of smiles. Next, we constructed the two levels of our manipulation according to the maximum and minimum within the range of the observed behaviors.

- (4) Eye contact
 - (a) Consistent eye contact (EYECONT+): The oncologist retains the patient’s gaze throughout the patient’s speech and refrains from looking at the computer screen or paperwork while talking or listening.
 - (b) Inconsistent eye contact (EYECONT-): The oncologist frequently gazes at the computer screen or paperwork while providing information or when the patient speaks [18,31,32].
- (5) Body posture
 - (a) Forward leaning and frontal posture (BODY+): The oncologist is seated directly facing the patient, leaning slightly forward over the table.
 - (b) Varying posture (BODY-): The oncologist alternates between a forward leaning, patient-directed posture and a backward leaning posture, leaning away at a 45° angle from the patient [19,33]. Gazing at the computer was intentionally unrelated to leaning away from the patient, to keep the two manipulations distinct.
- (6) Smiling
 - (a) Occasional smiling (SMILING+): the oncologist smiles occasionally, especially in the first and final phases of the consultation which involves more social talk. Smiles are modest, conveying understanding or encouragement [19].
 - (b) No smiling (SMILING-): the oncologist does not smile throughout the consultation

We combined the manipulations in every possible way, resulting in eight ($2 \times 2 \times 2$) video versions. Thus, an example of a video version is EYECONT-, BODY+, SMILING+. Care was taken to manipulate non-verbal behaviors independently of each other.

Recording of the scripts to video

Trained actors acted as the (male) oncologist and (female) patient. Actors were chosen instead of a real patient and oncologist, as the experimental nature of the study would require them to adhere strictly to the script. Moreover, the oncologist would need to

Table III. *t*-Test contrasting average scores on four items, to assess manipulation success.

	<i>N</i>	<i>M</i>	(<i>SD</i>)	<i>t</i> *	<i>p</i>
Body posture					
BODY-	9	6.389	0.936		
BODY+	9	6.750	1.581	-0.495	0.634
Eye contact					
EYECONT-	7	4.429	1.742		
EYECONT+	8	7.156	1.18	-3.130	0.020
Smiling					
SMILING-	5	5.75	1.311		
SMILING+	5	6.55	1.745	-1.835	0.140

*paired samples *t*-test.

repeatedly perform the script, while specifically varying aspects of his non-verbal behavior and keeping all other communication constant. Recordings were made in a large outpatient medical consultation room. The oncologist sat behind a desk wearing a white coat. To enhance viewers' engagement, the patient's point of view was employed throughout most of the recording. This means that the camera was directed towards the oncologist while looking over the patient's shoulder. Only three times, the camera faced the patient for one or two seconds. Two cameras were used for the patients' point of view, one with a zoom shot and one with a 'medium wide' shot.

Validation, stage II

For pilot testing, segments of the scripts were role played by the actors at the end of a training session. We recorded two verbally identical segments, lasting approximately one minute each, in which non-verbal communication varied, resulting in six fragments in total. Each pilot participant viewed four video-fragments; both variations of two of three non-verbal manipulations. Two medical oncologists, six researchers of medical communication, two healthy women and four former breast cancer patients participated. Both internal validity (manipulation success) and external validity (realism) were assessed.

Internal validity

To test whether manipulations were perceived as intended, four questions were used for each non-verbal behavior, to be answered on a 10-point Likert scale. For bodily posture, participants rated their perception of the oncologist's: (1) physical distance from the patient; (2) involvement with the patient; (3) sense of calm; and (4) professionalism. For eye contact, participants assessed the oncologist's: (1) amount of eye contact with the patient; (2) involvement; (3) interest; and (4) attention. For smiling, participants rated the oncologist's (1) amount of smiling; (2) kindness; (3) comforting attitude; and (4) seriousness. The items were analyzed separately as well as combined for each non-verbal behavior (i.e. by averaging scores on the four items).

Table III indicates that the manipulations for eye contact were successful: the condition with more eye contact was perceived as such. Although the means for smiling and forward leaning body posture were both higher compared to the no smiling and backward leaning body posture conditions, these differences were not significant. When looking at the individual items however, participants did perceive a small difference in the amount of smiling. The oncologist in the SMILING- video was perceived to smile less ($M=4.60$, $SD=1.51$) than in the SMILING+ video ($M=6.40$, $SD=2.61$; $t=-2.45$, $p=0.07$). No difference was found on individual items between the two conditions for body posture. The oncologist in the BODY- condition was perceived to have an equal physical distance to the patient ($M=5.11$, $SD=1.45$) as in the BODY+ condition ($M=4.78$, $SD=2.33$; $t=0.329$, $p=0.751$).

Based on these results, manipulations of body posture and smiling were enhanced. In the BODY+ condition, the oncologist was instructed to keep both elbows on the table at all times while leaning forward. In the BODY- condition, the oncologist sat backward with only his fingers on the table, and at times turned his body away from the patient, in a 45° angle. Individual remarks by pilot participants indicated that the smiles by the oncologist were at times somewhat unnatural, or looked nervous. The actor was therefore instructed to convey more comforting and encouraging smiles.

External validity

To assess realism, participants answered two questions ('*how realistic were the events in this video?*' and '*how believable were the events in this video?*'; 10-point Likert scale). Scores on the two items were averaged. Pilot participants ($n=12$) rated realism with a mean of 7.48 ($SD 1.25$). Answers on additional open-ended questions suggested that the communication between patient and oncologist could improve on authenticity, e.g. by slowing down the pace of the conversation. This was communicated to and practiced by the actors for the final videos.

All pilot participants except for the doctors were asked how much they could identify with the patient in the video (10-point Likert scale). Participants ($n=10$) scored a mean of 6.29 ($SD 2.58$). Answers on additional open-ended questions on how to increase the ability to identify with the patient suggested that the actor who played the patient at times came across as unnatural in her response to the oncologist. Changes were made by allowing the patient more time to think and process, and to change her tone of voice while speaking about emotional subjects. Based on additional remarks, small changes were made to the setup of the desk by adding a note pad, and to the script if the conversation did not flow naturally. Moreover, extra attention was paid to maintaining continuity in the videos while recording different variations.