

# Grounding styles of aged dyads: an exploratory study

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## Abstract

This paper reports an exploratory study of the *grounding styles* of older dyads, namely, the characteristic ways in which they mutually agree to have shared a piece of information in dialogue. On the basis of Traum's classification of grounding acts, we conducted an exploratory comparison of dialogue data on older and younger dyads, and found that a fairly clear contrast holds mainly in the types of acknowledgement utterances used by the two groups. We will discuss the implications of this contrast, concerning how some of the negative stereotypes about conversations with older people may arise from this difference in grounding styles.

## 1 Introduction

Clark (1996) developed the notion of *grounding* to capture intricate processes with which conversants establish a set of information as a shared *common ground* for on-going (and possibly subsequent) dialogue. In a grounding process, a conversant presents a piece of information verbally or non-verbally, and the partner issues a particular public signal of the receipt, understanding, or acceptance of that information. Once a piece of information is thus incorporated into a common ground, it is available as something that can be presupposed in subsequent communication, in which still another change to the common ground is worked out.

On the basis of Clark's work, Traum (1994) shows a way of substantiating the process of grounding in a finite-state transition model, which specifies what contributions to a grounding

process can be made by individual utterances in dialogue and how individual contributions combine themselves to make a sequence that completes the grounding. In Traum's terms, such contributions are *grounding acts*, and the units of utterance that can perform grounding acts are *utterance units*, and the sequences of utterance units that complete are *discourse units*.

Now, both Clark's and Traum's models of grounding are *generic*, in the sense that they both admit a significant range of forms or styles in which actual processes of grounding may take place. That is, their models tell us what forms of grounding sequences are *possible* or *well-formed*, but do not tell what particular forms are most frequent in actual dialogues or, more specifically, what forms are most frequent in what sorts of dialogue situations. Thus, on the basis of Clark's and Traum's work, natural questions arise as to *grounding styles*, namely, the possibility of characteristic forms of grounding sequences adopted by particular types of conversants in particular types of occasions.

This paper investigates this question in its special application to casual, non-task-oriented dialogues conducted by aged people. Do people develop a characteristic style of grounding as they age? If so, what exactly distinguishes their grounding styles in casual, non-task-oriented settings?

To address these questions, we collected a spoken dialogue data comprising both older dyads and younger dyads, and analyzed the grounding processes in our data on the basis of Traum's finite-state model.

Why are we particularly interested in possible grounding styles of aged people? It is rather common that younger people find difficult or get frustrated in conversing with aged people. Thus, a common stereotype says that conversations with aged people are slow-paced, repetitive, and

therefore boring. It is perhaps because of these oft-felt problems that younger people often adopt “patronizing speech styles” or “secondary baby talk” toward aged people, characterized by restricted topics, childlike expressions, directive speech, and exaggerated nonverbal signals (Ryan & Hummert, 1995) or by slower speech, varied paraphrases, decreased grammatical complexity, lower propositional density, and other modifications (Kemper & Vandeputte, 1995).

Now, it seems customary that these communicative problems between older people and younger people are attributed to the side of aged people only, to their difficulties in auditory reception, alleged slowness of understanding, and alleged stubbornness in accepting new ideas. However, they may not be problems with one side only, nor problems with cognitive capacities or personal characters of aged people, but may largely come from different grounding styles adopted by the two groups of people. That is, the ways they agree to have a piece of information shared may have different recurrent patterns, and this difference may be a real cause of the difficulty and the negative stereotype. If so, digging out this difference and identifying the characteristic grounding styles of aged people are a necessity for scientific treatments of communicative problems commonly attributed to aged people, as well as informed design of dialogue systems that interact with aged people.

Nevertheless, most studies related to communications of aged people have focused on the influence of aging on basic linguistic competence such as word retrievals (Tatsumi 1997, Ministry of Health and Welfare 1999), and studies of their behaviors in actual dialogues have been quite scarce. The studies by Ryan & Hummert (1995) and Kemper & Vandeputte (1995) did touch on the conversational styles adopted by aged people, but their focus was more on the conversational styles adopted by younger people toward aged people. The study by Bortfeld et al. (2001) was exceptional in that it measured the number of fillers, restarts, and repairs to evaluate disfluency of aged people's speech in conversational settings. Yet, the focus of this study was on the characteristics of speech by individual conversants, rather than the ways in which they interact. Thus, conversational styles of aged people, let alone their grounding styles, have been seldom

studied systematically.

Under this situation, we have no specific hypothesis as to whether aged people have any characteristic grounding styles and if so, what they are. Our purpose in this study is therefore exploratory, dedicated to a search for plausible hypotheses about grounding styles of aged dyads, rather than a verification of their existence and specifics. Although our study is thus hypothetical in nature, we did identify two clearly distinguishable grounding styles in our data, correlated with the age ranges of conversants. In the following, we will report what they are, how they are found, and what implications their difference has as to some negative stereotypes about conversations with aged people.

## **2 Method**

The details of the corpus, its collection, and the assignment of tags are given below.

### **2.1 Dialogue Data**

Our data consist of 5 dialogues by older dyads (age range: 80-88, sd: 2.1) and 5 dialogues by younger dyads (age range: 23-39, sd: 5.2). Most of the older participants were therefore so-called “older-olds,” meaning that they were between 75 and 85 years of age. Familiarities of the older dyads were strong: they had known each other since they were children or after they moved into the current areas of residence, although they started talking each other frequently after they joined a common local association several years ago. The younger dyads were also familiar with each other: they had worked in the same department of an institute for at least 3 months and up to 5 years and had talked with each other almost every working day.

Dialogues of older dyads were videotaped in a community center that the subjects regularly visit for activities of their association. Videotaping of younger adults took place in a lounge space of their work place. The dialogues were casual conversations in Japanese, involving no specific objectives or tasks. The dialogue topics between older dyads included community events, common friends, their girlhood, and garden work, while the topics between younger adults included their job, their children, their cars, and common friends. The length of a dialogue in either group was from 30 to

50 minutes. Older adults participated in our data collection on the voluntary basis, while we paid a small amount of money for participation of younger adults.

## 2.2 Transcription and coding

### Transcription

We transcribed a 5-minute portion after 3 minutes from the beginning of each dialogue. All words and word fragments audible to the ear were transcribed, including overlapping speech, nonlexical fillers (such as “uh”), and other vocalizations (such as laughter and whistle). After each dialogue was transcribed, we checked the videotape to add data of all noddings and salient gestures (facial expressions and hand movements) to the transcription. The transcriber solicited the help of some local residents to understand some of the dialectical expressions contained used in dialogues by older dyads.

### Coding

On the basis of Traum's finite-state transition model of grounding, we divided all speech in our dialogue data into *utterance units* (UUs), namely, “continuous speech by the same speaker, punctuated by prosodic boundaries (including pauses of significant length and boundary tones)” (Traum, 1994). One of the present authors then classified each utterance unit into one of seven categories of *grounding acts*, according to its contribution to a grounding process. Table 1 shows the seven categories of grounding acts and their definitions.

Table 1. Seven categories of grounding acts

Initiate (init)	An initial utterance component of a Discourse unit.
Continue (cont)	A continuation of a previous act performed by the same speaker.
Acknowledgement (ack)	An acknowledgement claiming or demonstrating understanding of a previous utterance. It may be either a repetition or paraphrase of all or part of the utterance, an explicit signal of comprehension such as “ok” or “uh huh”, or an implicit signaling of understanding.

Repair (repair)	Changes the content of the current DU.
ReqRepair (reqRepair)	A request for a repair by the other party.
ReqAck (reqAck)	Attempt to get the other agent to acknowledge the previous utterance.
Cancel (cancel)	Closes off the current DU as ungrounded.

### Reliability

To check the reliability of our coding scheme, we asked two independent subjects to code a portion of our data and compared their results with our own. As an instruction to these independent coders, we produced a coding manual that lists Traum's definitions of the seven categories of grounding acts (see Table 1), sample utterances of each category, and some general notes on treatments of marginal cases such as fillers, simultaneous utterances, and utterances with both Init and Ack functions. The subjects did some exercise coding before actual coding, and they were encouraged to ask questions about the coding standard during the exercise period. Both transcribed text and audio recording were available to the subjects during the actual coding. The subjects coded two partial dialogues one from older dyads and the other from younger dyads. Each dialogue was about 2.5 minute in length.

The interrater reliability among the original coder and these two subjects was excellent; there was an 83% agreement, with a Cohen's Kappa of .78, for dialogues by older dyads (UUs = 138, coders = 3, categories = 9) and a 78% agreement, with a Cohen's Kappa .77, for dialogues by younger dyads (UUs = 128, coders = 3, categories = 9).

## 3 Results

Thus, our data comprise both dialogues by older dyads and ones by younger dyads, but these two groups of dialogues were not tightly controlled in their settings and therefore are not appropriate for exact comparison. For the limited purpose of exploratory data analysis, however, it is convenient to tentatively divide our data into these two groups and compare them from various points of view. This section reports four main results of such exploratory comparisons, in terms of (1) the

length of discourse units, (2) the types of frequently used acknowledgments, and (3) the frequencies of collaborative completions and echoic responses..

### 3.1 Utterance units and discourse units

The two groups of dialogues had no significant differences in the total numbers of discourse units (older adults, 446; younger adults, 482) and the total numbers of utterance units (older adults, 1406; younger adults, 1309). This roughly means that older dyads grounded information as frequently as younger dyads, and the numbers of utterances needed for each grounding are about the same in older dyads and in younger dyads.

Also, the frequencies of occurrences of the seven categories of grounding acts were about the same in older dyads and younger dyads (Figure 1).

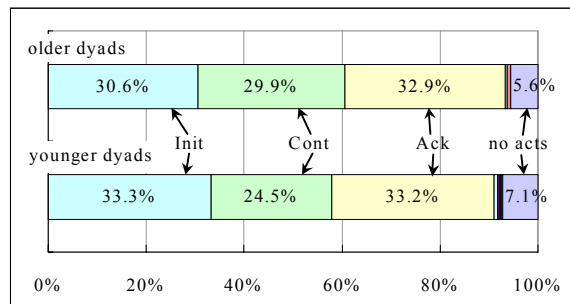


Figure 1. Ratios of grounding acts in older dyads and younger dyads

That is, older dyads used grounding acts in about the same variety and variance as younger dyads did.

### 3.2 Types of Acknowledgements

#### Initiation-acknowledgements

Generally, an “acknowledgement act” appears at the end of a grounding unit, indicating that conversants have mutually understood what the presenter said. In contrast, an “initiate act” appears at the beginning of a grounding unit, initiating the presentation of a new information unit. Sometimes, a speaker performs both initiation and acknowledgement at the same time, by producing an initiation utterance whose content presupposes the understanding of the preceding presentation.

An example is found in dialogue excerpt (1) from an older dyad, where one of B's utterances,

“a-hon-na-ikatta (that's good),” acknowledges the previous utterance of speaker A while initiating B's presentation of her own information.

(1)

act	UU	Utterance
init <sub>17</sub>	35.1	A: honera (so)
cont <sub>17</sub> (35.1)	35.2	: koneda[laugh] (the other day)
cont <sub>17</sub> (35.2)	35.3	: isha-so-ii-mashita (the doctor said so)
ack <sub>17</sub> init <sub>18</sub>	36.1	B: a-hon-na-ikatta (that's good)
ack <sub>18</sub>	37.1	A: n (m)
init <sub>19</sub>	38.1	B: sore-kiitara-anshin-yawano (that may make you feel at ease)

We found that acknowledgements of this type accounts for a 27% of all acknowledgement utterances made by younger adults, while they account for only a 10% of those by older adults (see the top section of each column in Figure 2). The difference was significant ( $t(5)=2.87$ ,  $.01 < p < .05$ , two-tailed).

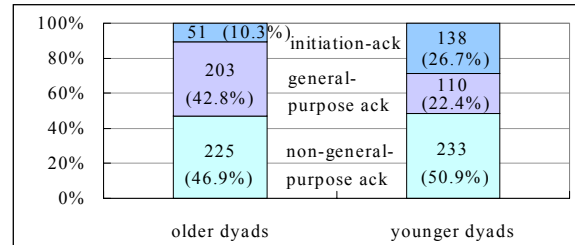


Figure 2. Ratios of the three types of acknowledgements in older dyads and younger dyads

#### General-purpose acknowledgements

Beside these dual-functional acknowledgments, there were a significant number of “dedicated” acknowledgements, namely, utterances annotated as “acknowledgements” but not as anything else. Inside these dedicated acknowledgements, however, we can distinguish two types. One type consists of *general-purpose* acknowledgements, such as “uh-huh” and “m,” that could be used irrespective of the contents of the preceding presentations. The other type comprises *special-purpose* acknowledgements, such as

repeating or paraphrasing responses, whose contents must vary depending on the contents of the preceding presentations. An example of general-purpose acknowledgement is speaker A's short utterance "n (m)" in excerpt (2). In contrast, speaker B's utterance "n-n-mite (m, you saw it)" in excerpt (3) is a case of special-purpose acknowledgment since it paraphrases the preceding utterance by speaker A and thus depends on its specific content.<sup>1</sup>

(2)

act	UU	Utterance
init <sub>26</sub>	50.1	B: nanka-sono (well)
cont <sub>26</sub> (50.1)	50.2	shinseki-no-hito-kaeru (the relative left)
cont <sub>26</sub> (50.2)	50.3	koro-ni-natte (at time)
ack <sub>26</sub>	51.1	A: n (m)
init <sub>27</sub>		B: obaasan-ga-kite (her grand mother came and)
cont <sub>27</sub> (52.1)		anta-aisatu-senkaine-tte (said "you must greet them")

(3)

act	UU	Utterance
init <sub>1</sub>	2.1	B: hora-sangousha-noran-naran-wa -tte (then I had to get in the third car)
ack <sub>1</sub>	3.1	A: [laugh]
init <sub>2</sub>	4.1	B: isshokenme-ni-sangousha-n-tok o-he (I tried hard to get to the car)
cont <sub>2</sub> (4.1)	4.2	: hata-sanbon-mitoite (seeing the flag)
ack <sub>2</sub>	5.1	A: n-n-mite (m, you saw it)
init <sub>3</sub>	6.1	B: hoite-ittara-mannin-ya-yappa (When I got to the car, it had no seats)
ack <sub>3</sub>	7.1	A: aa (ah)

Interestingly, older dyads produced more

general-purpose acknowledgements (43%) than younger adults did (23%). The difference is highly significant ( $\chi^2(2)=67.2, p<.01$ ), as we can also see by comparing the middle sections of the two column in Figure 2.

## Post-grounding acknowledgements

Dialogues conducted by older dyads contained several instances of requests for acknowledgement issued after acknowledgements, while those by younger dyads contained no such instances (older dyads, 9; younger dyads, 0). For example, the second request for acknowledgement "ne (see?)" towards the end of excerpt (4) was issued after the acknowledgment "n (m)" by speaker A, requesting further acknowledgement of the presentation "watashi-no-shita-wo (and my younger sister)" that had been already grounded. This phenomenon is particularly interesting since a request for acknowledgement after acknowledgement is not in the scope of Traum's finite-state transition model of grounding sequences.

(4)

act	UU	Utterance
init <sub>92</sub>	178.1	B: hoide-shita-ga (and my younger brother)
reqAck <sub>92</sub>	178.2	: ne (see?)
ack <sub>92</sub>	179.1	A: n (m)
init <sub>93</sub>	180.1	B: ano (what was that?)
cont <sub>93</sub> (180.1)	180.2	: nakanogou-he-yattee (they left him in relative hand)
ack <sub>93</sub>	181.1	A: n (m)
init <sub>94</sub>	182.1	B: watashi-no-shita-wo (and my younger sister)
ack <sub>94</sub>	183.1	A: n (m)
reqAck <sub>94</sub>	184.1	B: ne (see?)
ack <sub>94</sub>	185.1	A: n (m)

Furthermore, older dyads produced "acknowledgements after acknowledgements" slightly more frequently than younger did (older adults, 35; younger adults, 25). The second utterance "nn (m)" by speaker B is an instance of that type of acknowledgements.

<sup>1</sup> Actual classifications of dedicated acknowledgements into general-purpose and special purpose acknowledgements are subtler than suggested here. For example, an utterance that sounds "n (m)" could be classified as special-purpose if it has a marked prosodic feature that signals the speaker's emotion or feeling.

(5)

act	UU	Utterance
cont <sub>34</sub> (64.3)	64.4	B: hachiju-kara-ue-ni-narya-nani-wo-nn-na-aryan-na (as we get over 80's)
cont <sub>34</sub> (64.4)	64.5	: otoroeru-bakkari-ya (we are languishing)
ack <sub>34</sub>	65.1	A: hou-ya (right)
ack <sub>34</sub>	66.1	B: nn (m)

### 3.3 Collaborative completion and echoic response

Collaborative completions were slightly more frequent in older dyads than in younger dyads (older adults, 13; younger adults, 7). Likewise, echoic responses were more frequent in older dyads than in younger dyads (older adults, 23; younger adults, 10). Speaker A's second utterance in excerpt (6) is an example of collaborative completion done by an older dyad, and speaker B's second utterance in excerpt (7) is an example of echoic response done by an older speaker.

(6)

act	UU	Utterance
init <sub>37</sub>	74.1	B: hitori-oru-ga-to (whether being alone or)
ack <sub>37</sub>	75.1	A: n (m)
init <sub>38</sub>	76.1	B: nina-tooru-ga-to (being with someone)
cont <sub>38</sub> (76.1)	76.2	: debu-kibun-ga (feels)
ack <sub>38</sub> init <sub>39</sub>	77.1	A: chigau-ga (a big difference)
ack <sub>39</sub>	78.1	B: chigota-tte-ne (yes, it's different)

(7)

act	UU	Utterance
ack <sub>1</sub>	2.2	B: ooi-yo (you're right)
init <sub>2</sub>	3.1	A: tanba-dekiru-ga-ya (that's how rice can grow)
ack <sub>2</sub>	4.1	B: dekiru-ga-ya (can grow)

## 4 Discussions

Thus, our exploratory comparison suggests several points of difference between dialogues by older

dyads and dialogues by younger dyads. What would these individual differences reveal about common stereotypes about conversations with aged people? Do these individual differences combine themselves to define two different grounding styles attributable to older and younger dyads?

### 4.1 Initiation-acknowledgement utterances were less frequent in older dyads.

Initiation-acknowledgements are dual-functional utterances, performing two grounding acts by single utterance units. Dedicated acknowledgments are mono-functional, performing single grounding functions per single utterance units. Thus, if we define the *grounding tempo* of a given part of dialogue as the ratio of the number of utterance units to the number of different grounding acts performed by them, then an occurrence of initiation-acknowledgement certainly increases the grounding tempo of the local context.

In contrast, a dedicated acknowledgement has no such accelerative effect on grounding tempo, and a frequent use of dedicated acknowledgements may even cause impressions of relative slowness of the grounding tempo in the local context. Now our exploratory comparison indicated that older dyads used dedicated acknowledgements more frequently than younger dyads, who used initiation-acknowledgements more frequently. It is then plausible that this contrast in the kinds of frequently used acknowledgements underlies the common impression that conversations with older people are slow-paced and, since the grounding tempo is related to how efficiently information is shared, this contrast might partially account for the common impression that older people understand things slowly.

### 4.2 Older adults often acknowledged after acknowledgements.

In this regard, an occurrence of post-grounding acknowledgment must have a deceleration effect on the grounding tempo in the local context. For the grounding function it performs, namely, the acknowledgement of the presented information, is

one that has been done by the preceding acknowledgement, and thus the ratio of the number of utterance units to the number of grounding functions performed by them is even worse than the case of dedicated acknowledgments. Now again, our exploratory comparison indicated that older dyads used post-grounding acknowledgements more frequently than younger dyads. This contrast therefore might be an added cause to the stereotypes mentioned above, slow-pacedness and slow-understanding.

### 4.3 Older adults tended to use general-purpose acknowledgements more frequently.

Precisely because the form of a general-purpose acknowledgement, such as "uh-huh" and "m," does not depend on the content of the utterance being acknowledged, a general-purpose acknowledgement gives only weak evidence of reception or understanding of the content. In contrast, a special-purpose acknowledgement, such as repeating or paraphrasing responses, has stronger evidentiality, since its form is the result of an appropriate choice relative to the content of the acknowledged utterance. Now, our preliminary comparison indicated that older dyads used general-purpose acknowledgements more frequently than younger dyads, and this contrast may well be still another cause to the negative stereotype on older people's capacities for understanding during conversation.

### 4.4 Two Grounding Styles

Overall, our exploratory comparison suggests a particular style of grounding as characteristic to older dyads. That is, older dyads use more dedicated acknowledgments than dual-functional acknowledgements involving initiations, and among dedicated acknowledgements, older dyads use more general-purpose acknowledgements than special-purpose acknowledgements; they also use post-grounding acknowledgements relatively often, either spontaneously or solicited by requests for acknowledgements. Let us call this grounding style *style A*, and call the grounding style characterized by the opposite tendencies *style B*.

Now we have obtained this hypothetical contrast in grounding styles through an overall comparison of the entire group of older dyads and

the entire group of younger dyads. So the question remains how much this contrast applies to *individual* dyads of older and younger people. Aren't there any exceptional older dyads with grounding style B? Any younger dyads with grounding style A?

To address these questions, we re-evaluated our data and ranked all ten dialogues in our data according to the ratios of dedicated acknowledgements, the ratios of general-purpose acknowledgements, and the counts of post-grounding acknowledgements (solicited acknowledgements and spontaneous acknowledgements). Table 2 shows the result of ranking, where the hatched cells indicate dialogues by older dyads. Here we see that the contrast of style A and style B divides older dyads and younger dyads fairly clearly. In fact, the separation of older and younger dyads is statistically significant in the ratio of dedicated acknowledgements ( $W_0 \geq w_{5,5}(0.01) = 39$ , two-tailed), the ratio of general-purpose acknowledgements ( $W_0 \geq w_{5,5}(0.025) = 38$ , two-tailed) and the counts of solicited post-grounding acknowledgements ( $E(R) = 27.5$ ,  $V(R) = 36$ ,  $Z_0 = 3.75$ ,  $Z(a) = 3.09$ ,  $p < 0.002$ , two-tailed). Thus, our hypothesis associating style A to older dyads and style B to younger dyads receives some initial supports from this analysis.

On the other hand, Table 2 also shows certain exceptions to this association, namely, some older dyads with style B and some younger dyads with style A. This is only natural as we can easily imagine older people who talk like younger people as well as younger people who talk like older people. Styles are styles, and they are not natural traits exclusively possessed by particular species of creatures.

Table 2. Rank order of ten dialogues according to the ratios of dedicated acknowledgements, the ratios of general-purpose acknowledgements, and the counts of post-grounding acknowledgements (solicited acknowledgements and spontaneous acknowledgements)

dedicated acknowledgments		general-purpose acknowledgments		post-grounding acknowledgements			
				solicited		spontaneous	
percentage	rank	percentage	rank	counts	rank	counts	rank
58.41%	1	10.90%	1	0	1	3	1
62.02%	2	18.60%	2	0	1	4	2
80.00%	3	19.40%	3	0	1	5	5.5
81.32%	4	21.50%	4	0	1	5	5.5
84.11%	5	25.20%	5	0	1	5	5.5
84.95%	6	41.30%	6	0	1	5	5.5
88.89%	7	41.80%	7	0	1	6	7
88.99%	8	42.40%	8	1	8	7	8
93.27%	9	48.30%	9	4	9.5	10	9.5
93.33%	10	56.90%	10	4	9.5	10	9.5

\*Hatched cells are data of older dyads.

## 5 Conclusion

As a pilot study of the grounding styles of older dyads, we analyzed dialogue data featuring both older and younger dyads, and identified a certain contrast in grounding style that separates the two groups fairly clearly. In the style associated with older dyads, people use more dedicated acknowledgements than dual-functional ones, use more general-purpose acknowledgements than special-purpose ones, and use relatively many post-grounding acknowledgements. In the style associated with younger dyads, the opposite tendencies on the use of acknowledgements hold. On the basis of this contrast, we also discussed the implications of the adoption of the first grounding style, and conjectured that some of the negative stereotypes about conversations with older people may be based on this grounding style they adopt. Certainly, as the result of an exploratory study, all these observations are purely hypothetical. We only hope that this study has provided enough materials to set a stage for a further, more controlled comparison of grounding styles of older and younger dyads.

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