International Multidisciplinary Research Journal
ISSN: 2424-7073
Available Online at https://imrjournal.info/
Volume:1V; November 2026; Page No.24-34
DOI: https://doi.org/10.47722/imrj.2001.85

IMR JOURNAL CANADA

Research Article

FROM AMBIGUITY TO COLLABORATION: DISTRIBUTED COGNITION IN INTERCULTURAL COMMUNICATION THROUGH A SUIKAWARI TASK

Yue Zhang[1], Yugo Takeuchi[2]

[1]Ph.D. Student, Graduate School of Integrated Science and Technology, Shizuoka University, Shizuoka, Japan
[2]Professor, Faculty of Informatics, Shizuoka University, Shizuoka, Japan

ARTICLE INFO

Article History:

Received 15.07.2026
Accepted 15.10.2026
Published 25.11.2026

Keywords:

Ambiguity, Intercultural Communication, Distributed Cognition, Collaborative Compensation, Suikawari

ABSTRACT

Ambiguous expressions can complicate intercultural communication in caregiving workplaces, but participants may manage uncertainty through collaborative interaction. This study examines individual interpretations of ambiguity and the interactional processes through which ambiguous instructions are clarified. Study 1 surveyed 55 care workers (40 Japanese and 15 Chinese) using nine scenario-based expressions and a ten-point rating scale for interpretive difficulty. Separate one-way analyses of variance identified higher ratings among Japanese participants for five expressions; the remaining four showed no statistically significant group differences. Study 2 explored eight sessions of a modified Suikawari (watermelon-splitting) task involving Japanese, Nepalese, and Vietnamese participants. Video-recorded interactions were examined for conversational turns, confirmation, surrounding support, and task outcomes. Both successful sessions involved seven turns, Player confirmation, and support from surrounding participants, whereas the six unsuccessful sessions involved zero to three turns and neither confirmation nor surrounding support. These observations inform a preliminary framework linking Awareness, Compensation, Collaborative Understanding, and Task Achievement. Compensation is described at three levels: repetition, strategy shift, and reconstructive compensation. From a distributed cognition perspective, clarification may emerge through coordination among participants and their use of information about movement and spatial relations. The findings suggest that ambiguity can prompt collaborative meaning construction when opportunities for confirmation and supplementation are available. Unequal survey group sizes and the small exploratory task dataset limit generalization; the observed associations do not establish causality. The framework offers a basis for further research on communication training in multicultural caregiving workplaces.

Copyright© The Author(s) 2025. Open Access under the Creative Commons Attribution 4.0 International License (CC BY 4.0). This license permits use, sharing, adaptation, distribution, and reproduction in any medium or format, giving proper credit to the original author, including a link to the license, and indicating if any changes were made. To view a copy of the licence, please visit https://creativecommons.org/licenses/by/4.0/

1. Introduction

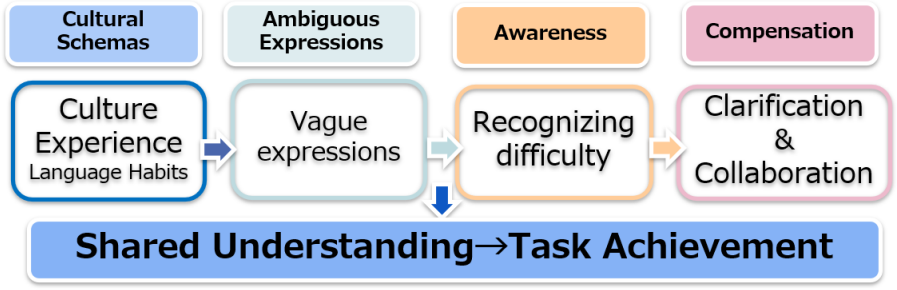
Japanese communication can involve context-dependent expressions such as "*daijoubu*" ("It is okay") and "yousu o mite kudasai" ("Please monitor the situation"). Their interpretation draws on contextual cues and shared understanding. Hall's (1976) concept of high-context communication offers one perspective on this dependence on context, although it should not be taken as a uniform description of all Japanese speakers.

Schema-based accounts suggest that prior experience shapes interpretation (Bartlett, 1932). Participants with different linguistic and cultural backgrounds may therefore assign different meanings to the same expression. In multicultural caregiving workplaces, these differences can create uncertainty about intended actions.

During collaboration, participants may address uncertainty through clarification, confirmation, reformulation, and behavioural adjustment. Meaning is then constructed through interaction rather than inferred by a listener alone. Distributed cognition provides a framework for examining how information is coordinated across people and their environment (Hutchins, 1995).

This study examines ambiguity in two complementary contexts. Study 1 investigates individual interpretations and perceived interpretive difficulty among Japanese and Chinese care workers. Study 2 examines how participants clarify and supplement instructions in a collaborative *Suikawari* task. The studies involve different participant groups and tasks; they provide complementary evidence rather than a longitudinal test of a single process. Figure 1 presents the proposed framework linking culturally shaped interpretation with collaborative compensation.

Figure 1. Process Model of Collaborative Ambiguity Compensation



Note. Conceptual model proposed in this study, informed by schema theory and distributed cognition.

This study addresses the following research questions:

RQ1: How do participants address ambiguous instructions through collaborative compensation?

RQ2: What roles do surrounding participants and environmental resources play in the compensation process?

2. Methodology

2.1 Study 1: Questionnaire Survey on Ambiguous Expressions

2.1.1 Survey Procedure

Participants responded to scenarios containing nine ambiguous expressions used in Japanese caregiving contexts: "*ii desu*" ("It is fine"), "*muri naku*" ("without overexerting yourself"), "*dekirudake*" ("as much as possible"), "*daijoubu*" ("It is okay"), "*tekido ni*" ("to an appropriate extent"), "*yousu o mite*" ("monitor the situation"), "*maamaa*" ("so-so"), "*moshi dekitara*" ("if possible"), and "*nantoka naru*" ("Things will work out"). These English glosses are approximate; the intended meanings depend on context. The questionnaire was presented in Japanese; romanized forms are used here for readability.

For each scenario, participants selected the option that best represented the speaker's intended meaning: wants assistance, does not need assistance, wants to do it alone, politely declines an offer of help, or does not know.

Participants rated interpretive difficulty on a ten-point scale (1 = not difficult at all; 10 = extremely difficult). The survey included 55 care workers: 40 Japanese and 15 Chinese participants. All Chinese participants had Japanese proficiency equivalent to level N2 or higher on the Japanese-Language Proficiency Test (JLPT) and used Japanese in their daily work. Most participants had more than three years of caregiving experience.

The study received approval from the Shizuoka University Research Ethics Committee for Studies Involving Human Subjects (Approval No. 24-34; October 18, 2024). All participants received information about the study and provided informed consent. *Suikawari* participants were additionally informed that audio and video recordings would be used solely for research purposes; recordings were handled in accordance with the approved ethical procedures.

2.1.2 Analysis

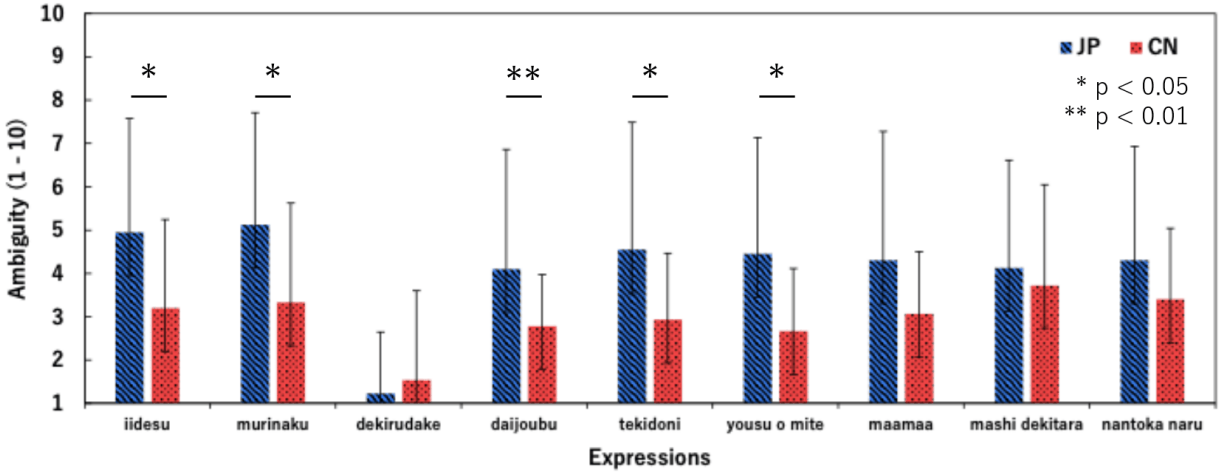
The scenario-based questionnaire elicited context-dependent interpretations, drawing on accounts of contextual meaning and schema-based interpretation (Clark, 1996; Schank & Abelson, 1977).

A separate one-way analysis of variance (ANOVA) compared the Japanese and Chinese groups for each expression, with nationality as the independent variable and interpretive-difficulty rating as the dependent variable. These ratings are referred to below as perceived ambiguity scores. Means, standard deviations (SDs), and eta squared (η^2) were calculated. The significance threshold was $p < .05$. The nine tests should be interpreted as exploratory because the reported p values are unadjusted for multiple comparisons. Interpretation choices were examined descriptively.

2.1.3 Questionnaire Survey Results

Figure 2 presents mean perceived ambiguity scores and SDs for all nine expressions. Japanese participants generally reported higher scores, although the size of the difference varied across expressions.

Figure 2. Mean Perceived Ambiguity Scores for the Nine Expressions by Nationality



Note. JP = Japanese participants (n = 40); CN = Chinese participants (n = 15). Error bars indicate SDs. *p < .05; **p < .01 (unadjusted).

At the unadjusted p < .05 threshold, Japanese participants reported higher scores for five expressions: "ii desu," "muri naku," "*daijoubu*," "tekido ni," and "yousu o mite." No statistically significant differences were found for "*dekirudake*," "*maamaa*," "moshi dekitara," or "nantoka naru" (Table 1).

Table 1. One-Way ANOVA Results

Expression	**F**	**p**	**η^2**
ii desu	5.39	.024	.092
muri naku	5.56	.022	.095
Dekirudake	0.40	.532	.007
Daijoubu	10.36	.002	.163
tekido ni	4.08	.049	.071
yousu o mite	5.91	.018	.100
Maamaa	2.34	.132	.042
moshi dekitara	0.28	.599	.005
nantoka naru	1.52	.223	.028

Note. df = (1, 53); η^2 = eta squared. Reported p values are unadjusted for multiple comparisons.

"*Daijoubu*" had the largest effect size (η^2 = .163). These results identify expression-specific differences in reported difficulty, but do not explain how participants manage uncertainty during interaction. Study 2 examines this interactional process.

2.2 Study 2: Collaborative *Suikawari* Task

Study 2 used a modified *Suikawari* (watermelon-splitting game) as an exploratory collaborative task. In the traditional game, a blindfolded participant follows verbal instructions to approach and strike a target.

Restricting the Player's vision made reliance on instructions, confirmation, and surrounding support observable. The task was intended to explore compensation processes, rather than reproduce caregiving interactions or test cultural differences experimentally.

2.2.1 Task Overview

The blindfold prevented the Player from using visual cues such as gestures and gaze. Participants therefore relied primarily on speech to coordinate direction and distance. Expressions such as "a little more," "keep going," and "there" emerged during interaction. Figure 3 shows the experimental setup.

Figure 3. Experimental Setup for the Collaborative *Suikawari* Task



Note. Photograph taken by the authors.

2.2.2 Participants and Procedure

Across the eight task sessions, there were 16 participant appearances in the Commander and Player roles: eight Japanese, seven Nepalese, and one Vietnamese. Non-Japanese participants had Japanese proficiency equivalent to JLPT N3 or higher, allowing the task to be conducted in Japanese.

Participants worked in pairs. One participant assumed the role of Commander (C), while the other served as Player (P). The Player wore a blindfold and attempted to strike a target representing a watermelon by following the Commander's spontaneous verbal instructions.

Roles or pair combinations changed between sessions, and eight task sessions were conducted. Brief open-ended post-task comments provided supplementary qualitative data on participants' experiences.

2.2.3 Data Analysis

The entire experiment was video and audio-recorded. All verbal interactions were transcribed, and the utterances produced during each task were analyzed.

For each session, participants' nationalities, conversational turns, outcome (success or failure), Player confirmation, and surrounding support were recorded. The analysis compared these features descriptively across sessions. Open-ended comments were reviewed as supplementary accounts of the activity.

3. Results

3.1 Characteristics of Instruction Expressions

Both Japanese and non-Japanese Commanders used ambiguous instructions such as "a little," "a little more," and "keep going" to guide movement.

In the observed sessions, Japanese Commanders sometimes supplemented these expressions with movement instructions (e.g., "Walk forward" or "Turn to the right"), progress information, or numerical indications of direction and distance.

Non-Japanese Commanders also used instructions such as "A little to the left" and "Just a little." Their utterances tended to be shorter and contained fewer supplementary explanations or reformulations.

These patterns describe the observed sessions only. The small dataset does not support general conclusions about national or cultural communication styles.

3.2 Interaction Patterns in the *Suikawari* Task

A conversational turn was defined as a continuous utterance by one participant; a speaker change marked a new turn. Task-related utterances from surrounding participants were included in the analysis.

Two of the eight sessions were successful. Both involved seven turns, Player confirmation, and surrounding support. The six unsuccessful sessions involved zero to three turns and neither Player confirmation nor surrounding support (Table 2).

Table 2. Summary of the *Suikawari* Task Sessions

No.	Pair	Turns	Confirmation	Support	Outcome
1	JP/JP	3	No	No	Failure
2	JP/NP	1	No	No	Failure
3	NP/JP	7	Yes	Yes (2)	Success
4	NP/NP	0	No	No	Failure
5	JP/NP	1	No	No	Failure
6	JP/NP	1	No	No	Failure
7	JP/NP	1	No	No	Failure
8	VN/JP	7	Yes	Yes (3)	Success

Note. Pair order = Commander/Player. JP = Japanese; NP = Nepalese; VN = Vietnamese. Confirmation = Player confirmation utterances. Support = task-related utterances from surrounding participants; parentheses indicate the number of supporters.

Successful sessions included confirmation such as "Is this direction okay?" and "Should I keep going?" Surrounding participants added information through counting, directional correction, and comments on posture. These contributions accompanied Commander–Player exchanges and supported continued coordination.

3.3 Successful Task Cases

In Task 3, surrounding participants supplemented brief instructions by counting aloud ("One, two, three, stop"). The Player also checked direction by asking, "Is this straight?" before proceeding.

In Task 8, utterances such as "Right," "The opposite way," and "Your body is leaning" supplied information for adjusting direction and posture. In both successful sessions, continued interaction made initially ambiguous instructions more specific. Both involved a non-Japanese Commander and a Japanese Player, but this pattern cannot establish an effect of nationality or role assignment.

3.4 Unsuccessful Task Cases

In unsuccessful sessions, ambiguous expressions were repeated without sufficient additional information. Table 2 records no Player confirmation or surrounding support in these sessions.

Instructions such as "Right, right, right" and "A little more" were not supplemented with sufficient specific information about direction or distance to enable successful adjustment before the task ended.

The comparison suggests that outcomes were associated with the ways participants supplemented and checked instructions. The presence of ambiguity alone did not account for the observed outcomes, and the observations do not establish whether richer interaction caused success.

4. Discussion

4.1 Cultural Schemas and the Interpretation of Ambiguous Expressions

Study 1 identified higher perceived ambiguity scores among Japanese participants for five expressions at the unadjusted significance threshold. Schema-based interpretation offers a possible explanation, but the questionnaire did not directly measure cultural schemas.

Study 1 concerns reported difficulty in individual interpretation; Study 2 concerns compensation during joint action. Together, they motivate a framework connecting interpretive uncertainty with interactive clarification. Because the samples and tasks differ, this connection remains conceptual rather than evidence of a demonstrated sequential process.

For example, "*ii desu*" can indicate acceptance, refusal, or a polite refusal intended to spare the other person trouble, depending on the situation. Japanese participants may have considered a wider range of contextual possibilities. However, the ratings alone cannot determine which interpretive strategies either group used.

"*Daijoubu*" showed the largest effect size ($\eta^2 = .163$). It can convey reassurance or the ability to manage a situation, while its intended meaning depends on context. Greater

sensitivity to these possibilities could account for higher Japanese ratings, but this explanation requires interviews or analysis of actual workplace use.

4.2 Interpretation of Ambiguous Expressions in Collaborative Interaction (RQ1)

The *Suikawari* observations suggest that ambiguous instructions can become more specific through reformulation, confirmation, and action adjustment. In the successful sessions, Players and surrounding participants helped supplement information that was absent from the initial instruction.

These cases illustrate collaborative meaning construction rather than demonstrating that a particular strategy guarantees success. The task outcomes provide evidence of coordinated action, but shared understanding itself was not measured independently.

4.3 The Role of Surrounding Participants and the Environment (RQ2)

In successful sessions, surrounding participants contributed counting, directional corrections, and posture information. Information relevant to action was therefore available among several participants, rather than solely from the designated Commander. The Player's movement, target location, and spatial relations supplied information that sighted participants could translate into speech. This is consistent with distributed cognition (Hutchins, 1995), although the contributions of individual environmental resources were not separately measured.

4.4 A Three-Level Model of Collaborative Compensation

Figure 4 presents three forms of compensation used to interpret the interactions. Awareness refers to recognizing that an instruction leaves uncertainty or provides insufficient information. The three levels are analytical categories, not a validated developmental sequence.

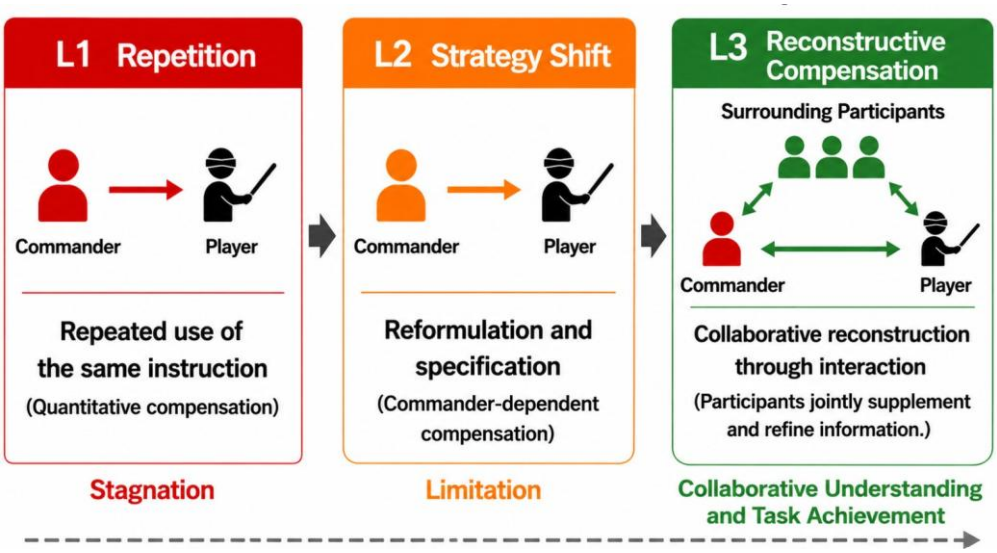
Level 1 (Repetition): The same ambiguous instruction is repeated without adding information. Uncertainty may therefore remain unresolved.

Level 2 (Strategy Shift): The Commander reformulates instruction with more specific information about movement, distance, or direction.

Level 3 (Reconstructive Compensation): Player confirmation and surrounding support jointly supplement and refine an instruction, drawing on information about the ongoing action and spatial environment.

Both successful sessions exhibited Level 3 features. This association motivates further investigation, but the dataset is too small to establish that Level 3 is necessary or sufficient for success.

Figure 4. Three-Level Model of Collaborative Ambiguity Compensation



Note. Conceptual model proposed in this study is based on interaction patterns observed during the collaborative *Suikawari* task.

4.5 Ambiguity as a Collaborative Resource

The post-task comments included Japanese participants' reports of difficulty giving instructions and non-Japanese participants' positive accounts of enjoyment and interaction (Table 3). These selected comments illustrate participants' experiences; they do not establish systematic cultural differences.

Table 3. Representative Open-Ended Responses from the Post-Task Questionnaire

Group	Main Theme	Representative Comments
JP	Difficulty in conveying ambiguous expressions	"It was difficult to convey expressions such as 'a little.'"
JP	Difficulty giving instructions	"It was difficult to guide the Player."
NP	Language learning	"It was a good opportunity to practice Japanese."
VN	Enjoyment	"It was fun."
NP	Cultural familiarity	"We have similar games in Nepal."
NP	Interaction	"It was enjoyable to communicate with others."

Note. Created by the authors.

The observations suggest that ambiguity can prompt confirmation and coordination when participants have opportunities to supplement information. The proposed process is:

Awareness → Compensation → Collaborative Understanding → Task Achievement

This framework describes a possible pathway through which uncertainty is managed. Awareness was inferred from interaction, and collaborative understanding was inferred from coordinated behaviour; neither was independently measured. The interpretation is consistent with Clark's (1996) account of joint action and Hutchins' (1995) distributed cognition

framework. It does not imply that ambiguity is inherently beneficial or that the pathway occurs in every interaction.

5. Conclusion

The questionnaire and exploratory *Suikawari* task examined complementary aspects of ambiguity in intercultural communication. Study 1 identified expression-specific group differences in perceived difficulty, while Study 2 illustrated how participants supplemented instructions during joint action.

Both successful task sessions involved Player confirmation and surrounding support, alongside longer interaction than the unsuccessful sessions. These observations inform the proposed Awareness–Compensation–Collaborative Understanding–Task Achievement framework and the distinction between repetition, strategy shift, and reconstructive compensation.

The findings suggest that ambiguity can prompt collaborative clarification when participants coordinate information distributed across people and their environment. Subject to further validation, the framework may inform research on communication training in multicultural caregiving workplaces.

The survey had unequal group sizes (Japanese n = 40; Chinese n = 15), and expression-level significance tests were unadjusted for multiple comparisons. Study 2 included only eight sessions, two successful, with changes in roles or pair combinations. Sessions should therefore not be assumed to be independent participant observations. The associations cannot establish causality or generalizable cultural patterns. The proposed models are preliminary analytical frameworks.

6. Future Directions

Future research should replicate the survey with larger, more balanced samples, address multiple testing, and assess statistical assumptions. Larger task studies could test the compensation framework using systematic role allocation and explicit coding procedures. Interviews or stimulated recall could examine awareness directly. Studies of caregiving interactions could then assess whether the proposed compensation patterns support shared understanding and coordinated action in practice.

Communication training could provide opportunities to request clarification, reformulate instructions, and involve surrounding colleagues. Applications to intercultural education or AI-assisted communication support remain possibilities for future testing rather than demonstrated outcomes of this study.

References

Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. Cambridge University Press.

Clark, H. H. (1996). *Using language*. Cambridge University Press.

Hall, E. T. (1976). *Beyond culture*. Anchor Books.

Hutchins, E. (1995). *Cognition in the wild*. MIT Press.

Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals, and understanding: An inquiry into human knowledge structures*. Lawrence Erlbaum Associates.

Nishida, H. (1999). A cognitive approach to intercultural communication based on schema theory. *International Journal of Intercultural Relations, 23*(5), 753–777.

Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals, and understanding: An inquiry into human knowledge structures*. Lawrence Erlbaum Associates.

Shirai, C., Nonaka, D., & Kobayashi, J. (2024). Evaluating the cross-cultural competence instrument for healthcare professionals (CCCHP) among nurses in Okinawa, Japan. *BMC Health Services Research, 24*, Article 369.

Teraoka, M., & Muranaka, Y. (2017). Zainichi gaikokujin ga jikkan shita Nihon no iryō ni okeru ibunka taiken no yōsō [Aspects of cross-cultural experience perceived by foreigners living in Japan when using its healthcare services]. *Journal of Japan Academy of Nursing Science, 37*, 35–44.

AI Assistance Statement

ChatGPT (OpenAI) was used to assist with English language editing, the presentation of statistical results, manuscript condensation, and formatting. The authors take full responsibility for the research design, data collection, analysis, interpretation, verification of all numerical results, and accuracy of the final manuscript.

How to cite this article:
Zhang Y.; Takeuchi Y. (2026) 'From Ambiguity to Collaboration: Distributed Cognition in Intercultural Communication Through a Suikawari Task, *International Multidisciplinary Research Journal*, Volume:1V; November 2026; Page 24-34. DOI: https://doi.org/10.47722/imrj.2001.85